FOOD INDUSTRIES

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Laurence V. Burton, Editor

National Tariffs May Be Bad; Local Tariffs Are Worse

SOMEHOW, the California Legislature did not pass an oleo tax measure last winter, but since then certain counties have concluded that oleo is a good article to license. Kings County has adopted an annual $200 license fee for each store handling butter substitutes. During the hearings, one of its proponents candidly admitted that the measure was, in a sense, a tariff to protect the local dairy industry. Two other California counties are reported to be considering similar measures.

AN OFFICIAL of the Oregon state government, whose position demands a little more impartiality than he has shown, addressed a dairy group with the remark, "Oleomargarine was originally a product of war, and you know what Sherman said war was," and then went on to pile innuendo on inaccuracy until he had made out margarine to be a worthless and nauseating article of food. Only from a purely demagogic political standpoint could there have been any excuse for his remarks.

TWENTY-THREE states now have prohibitory licensing or taxing requirements on margarine, many of them recently enacted. It is safe to predict that when the price differential between margarine and butter becomes greater than the present taxes—of 10 to 15 cents a pound—there will be a movement for repeal of some of these regulations and taxes. And since market surveys conducted by the Pure Bred Jersey Live Stock Registry Association has shown that the farmer is the largest market for margarine, the move for repeal can be expected to arise from the farmer.

LOCAL TAXES such as these are more likely to be a boomerang than an enduring benefit. From the standpoint of those who were already engaged in producing butter fat when the anti-margarine rumpus was raised last year, we fail to see any essential difference between competition of butter with margarine and butter with more butter, for just as soon as the price of butter fat shows a real profit to its producers, there is going to be a scramble for that profit, and only the low-cost producers will get it.

FARMERS today are increasing the size of their dairy herds, and their spokesmen point to the very low figures for butter fat in cold storage as evidence of the excellent statistical position of butter, and justify the increase principally on that basis. All this is well and good except for the important fact that money is hard to get right now and price trends are downward.

WHEN either overpriced butter or the taxed oleo is purchased, some other food product which the consumer did not buy makes up for the increased price paid, in which case other food manufacturers are, in effect, paying a subsidy to the butter-fat producer. Enactment of local taxes on food products, other than taxes obviously necessary for regulation, is a dangerous precedent.

Using the Factory as a Sales Aid

EVERYBODY likes to visit a food factory, for it is the one form of manufacture that interests men and women alike. A trip through an immaculate, well-ventilated plant, where the guides are properly trained in their functions, will leave an enduring favorable impression that will inevitably react in better sales; but to get the public to ask to come into the factory is not always so easy. Inviting signs which say that visitors are welcome will attract a few sightseers, but not enough to utilize the full selling value of a well-managed plant.

Recognizing the desirability of drawing as many visitors as possible, Wheatsworth, Inc., has done a very clever thing in building the famous Ginger Bread House on the factory grounds, locating it very close to a prominent highway at Hamburg, N. J. The motif, as explained on the contents page, came from Humperdinck's opera "Hänsel und Gretel," with a studied appeal to children. For a child, the trip through the Ginger Bread House is a trip to Fairyland. The lure is irresistible, as many a parent can testify. In pleasant summer weather the visitors sometimes number into the thousands in a single day—with the highest figures on Sundays.

Only one route is provided to visit the Ginger Bread House, which lies through the factory where all the ingenuity of showmanship found in the house from Fairyland has been given a dignified free play. Visitors not only are welcome; they are adroitly inveigled into the plant and, better yet, proper provision is made for their comfort while there. No hazards, no dust, no crowding through narrow aisles is necessary. Other manufacturers of food will do well to study this excellent example.

Equipment Can Be Injured By Careless Cleaning

WHENEVER your plant acquires any new equipment made from stainless steel, it is imperative that those who use it, particularly those who clean it, be fully informed of its proper care. The ordinary services to which stainless steels may be put do not involve any particular hazards for the material, but at clean-up time there is often a possibility of creating a situation leading to corrosion. Any material of construction that is susceptible to attack by hydrochloric acid is subject to this hazard irrespective of the material involved.

Calcium chloride brines or sodium chloride brines containing marked quantities of calcium and magnesium impurities, under certain conditions will be very corrosive, due to the hydrolytic formation of hydrochloric acid. These conditions occur especially when small drops of the brine are allowed to stand on the equipment in contact with air, such as might happen when brine is drained from the jacket of a cooling tank or an ice cream freezer. Your chemist can explain how a droplet of brine under these conditions will develop a minute quantity of acid that will cause a small pit in the metal.

If this evil is to be prevented, it can be done easily by washing out the brine with water, or, even better, by subsequently filling the brine space with water to prevent access of air until the apparatus is next used.

A similar form of corrosion may occur through improper use of chemical sterilizers. When they are used and allowed to dry on the surface of stainless steel equipment, they also may start pitting. At the recent meeting of the Institute of Dairy Engineers, L. W. Hostettler, of the Allegheny Steel Co., reported that he had observed truck tanks which were being ruined by carelessness in this respect. The remedy, he pointed out, was to use these sterilizers just prior to the start of the operating cycle. Permitting the chemical sterilizer to dry on and remain for a long period of time is to be avoided. Proper understanding of these features will pay large dividends through prolonging the life of equipment.

Canning Gains in England

"LET the Europeans settle their own problems"—that attitude of what-care-we has always been a strong point among such isolationists as Senator Hiram Johnson, of California. Now, despite all the grief we hear about England, they are solving one of their problems, and many of Senator Johnson's constituents are among the first to be affected.

Great Britain is building a canning industry. Compared to our own packs, the estimate of 120,000,000 cans for 1931 may not seem so impressive, but remember that a few years ago that country had practically no canning industry at all. Canned vegetables, for instance, rose from 1,500,000 cans in 1928 to 15,700,000 cans in 1930. During the World War, fruit canning in Great Britain was prohibited to conserve tin plate; last year it is estimated that about forty million cans were packed. New can factories have been erected. British journals covering the industry have continually grown bulkier. Even the venerable *Times* has recently burst forth with a twenty-page supplement headed, "Forward, the British Canning Industry"!

Until recently, the chief impetus given the industry resulted from the National Mark Plan, begun in 1928. This is more than a patriotism campaign, although it has made full use of that element. First of all, it involves standardization and grading, under control of the Ministry of Agriculture, on the part of those entitled to use the National Mark. Advertisements back up the "Buy British" slogan with the statement that the uniform national grading service assures standards of quality not found in imported products. Retail grocers are particularly under pressure to foster the sale of foods bearing the National Mark.

Now the industry is benefiting further by the fall of the pound sterling. Agricultural economics may indicate that growing areas in England can scarcely compete with our own in basic costs of production, but the cycle of interrelated expense wholly within the influence of the pound sterling is a more important factor at the present time. Moreover, although England still plans no tariff on processed food, growth of the industry on a strong nationalistic basis leads one to wonder about the future.

What are we going to do about it? you ask. Apparently it is too late to do very much in this particular case. In recent years we have exported some $2,000,000 worth of canned fruits and vegetables to England each year. Our total exports (1930) of these products were worth about $30,000,000, so a loss of part of the British market is not in itself an irreparable injury. However, we may not continue to be quite so nonchalant in our nationalism if the rest of the world begins to solve more of its problems in the same fashion.

Controlled Marketing Shows Value

SHIPMENTS and imports of citrus fruit in 1931 amounted to 167,000 carloads, as against 113,000 in 1930. In the face of a depression year and competition from other extremely low-priced fruits, this is, indeed, a remarkable record. Half of the total number of carloads came from California and Arizona. Three-fourths of the California and Arizona shipments were sent out by one organization. Probably one-half the remaining shipments from other sections of the country were also sent to market under cooperative auspices, indicating that something over one-half the citrus fruit consumed was marketed under controlled conditions.

It is well known that the principal cooperative shippers in the business have been assisting the growers of Texas and Louisiana to form cooperative marketing organizations. Grapefruit from these states is certain to become a competitor of no mean proportions, but it will be far better for Florida and California to have competitors who endeavor to market their products in an orderly manner than to have unorganized and panicky growers who ship to markets already oversupplied, to the demoralization of prices for everybody.

No small part of the success hitherto enjoyed by the citrus growers can be attributed to a wise marketing policy that has avoided glutting markets with fruit, and to continued efforts to increase the use of their products by advertising. As usual, their success has attracted competition, and soon the world will be oversupplied with the citrus fruits, at least from the producers' standpoint.

While there can be no disregarding of this disagreeable fact, the citrus industry, with its background of years of controlled marketing experience, is in a better position to face such a situation and cope with it than are industries whose markets have had little cooperative attention. If more long-range planning of business operations results from the present economic depression, then it might be well to consider the methods of some of these groups who already have gained some experience in marketing control.

Who Shall Pay for Smaller Containers?

SINCE the earliest days of food processing and shipping, there has been agitation for smaller containers by some factor in the distribution function. If the critic is not dissatisfied with the food package itself, he launches an attack upon the shipping container. Always he is crying for smaller units and insists that the manufacturer is not in step with the times if the smaller units are not supplied.

This is a question of great importance to any food manufacturer, and while he realizes that it is always good business to provide the customer with what is wanted, he also realizes that this want can be satisfied only if the customer is willing to pay the cost. During more prosperous years the customer was not so critical of costs and paid the extra charge to get what he wanted.

In these days of lower prices, advantage is being taken of lower costs, due to packing in larger units, in order to give the customer the goods he wants at the prices he is willing to pay. This economy gives our perennial critic the opportunity to renew his attack upon the food manufacturer with the insistence that these goods be supplied in the smaller units. The manufacturer replies, "Fine! But who is going to pay for the extra expense?" To which the critic answers, "You."

Here is where we take issue. We contend that if more expensive packing is being demanded by the customer, he should be willing to meet the extra cost. Otherwise, the manufacturer will have to carry on his business without a profit, or possibly at a loss to meet the demand of the insistent customer.

Actual packing studies have shown that the direct labor cost alone is 69 per cent greater per pound for packing cocoa powder in ⅓-pound cans instead of in ½-pound cans. The container cost is approximately 50 per cent greater per pound.

In the case of packing canned foods, 8, 12, 24, or 36 No. 2 cans per case, competitive container prices show that the shipping container cost per can is from 40 to 50 per cent in favor of the largest units compared to the 8-can unit.

In the face of these facts, it is unreasonable to expect the manufacturer to absorb this extra expense just to satisfy the whims of chronic critics.

Can You Identify Your Product?

CANS of salmon were recently purchased in the open market by regulatory officials and found not to conform to the Food and Drug Law. Tracing the cans from retailer to wholesaler and back to the manufacturer showed that the wholesaler had purchased his shipment from three different canners, all in the same neighborhood. No code marks of any kind were on the cans, so that it was not possible to find from which canner the off-quality product came. At last reports, 12,000 cases of salmon still on hand in the warehouses of the three canners had been divided into 120 lots of 100 cases each, and each lot was being examined to find the lot containing the offending cans.

It hardly seems believable that any canner or other food manufacturer does not put some sort of code mark on his packages so that they may be identified when found, yet regulatory and trade association laboratory officials are continually harping on this subject.

Marking packages of finished products with identifying symbols has many advantages, and is strongly recommended to all manufacturers of packaged food products who do not now practice it. The advantage from a legal standpoint is well indicated by the story just told. Had the cans of salmon been marked with a code indicating the canner, the date packed, and the batch number, it would have been necessary only to segregate a single batch of cans for further examination. The examination could have been made quickly, the loss would have been small, and much wear and tear on several men's tempers would have been saved.

The value of being able to pick up a package of your food products purchased in any market and, from a code mark on it, being able to tell when and where it was packed, is self-evident. This should be particularly true with products that deteriorate with age and hence have a limited shelf life. Unjust claims could be prevented and dealers helped to maintain fresh stocks.

Again, products which are still more or less experimental, or whose method of manufacture is still in a state of flux, almost require some sort of mark if the experiment is to be carried to a logical conclusion. Not a great deal of ingenuity is required to work out a fairly elaborate coding system with a few simple symbols, and the advantages of coded packs are great enough to make it worth while adopting some system of so marking each package of goods turned out.

Science Dispels Mystery From Macaroni Drying

The origin of macaroni is lost in the Middle Ages, and its manufacture was long a mysterious art. In recent times, however, American ingenuity has determined the scientific basis of the process and today the product made in this country is the equal of any

By GLENN G. HOSKINS
Vice-President, Foulds Milling Co., Libertyville, Ill.

MACARONI is the generic term for the varied line of products having as a base semolina, farina or flour mixed with water; and formed, under pressure, into a variety of shapes embracing macaroni, spaghetti, noodles, vermicelli, alphabets, rings, stars, sea shells and many special forms.

Semolina, the purified middlings of durum wheat, usually is stored on an upper floor of the plant and fed by gravity through sifters to insure the removal of any foreign materials that may have been introduced between the milling process and the dumping of the semolina to the mixers. These mixers are power-driven units in which a projecting arm revolving around a horizontal axis in a metal tub agitates the semolina so that each particle comes in contact with water to form dough.

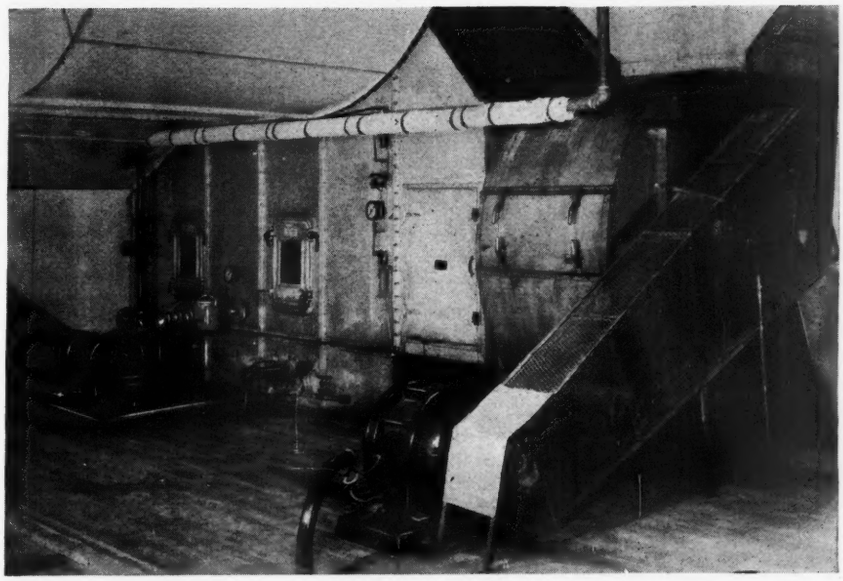
From the mixer the dough is dumped into a kneader, consisting of two or three corrugated rollers supported so that they exert pressure on the dough which is carried around under them by a circular, power-driven pan. A steel plow placed in front of one of the rollers turns up the dough before it passes under the rollers in such a way as to speed the kneading action and work the mass uniformly.

When the kneading action is completed the dough is ready to be formed into macaroni, spaghetti or any of the many other forms. Macaroni embraces all forms of the product, but at the same time the word "macaroni" is specifically used to designate an item of the line which is tubular in shape, about $\frac{1}{4}$ in. in diameter and of any length from a few inches to several feet. Macaroni and spaghetti are the most common forms. Spaghetti is a solid rod about $\frac{1}{16}$ in. in diameter and of any length desired, within reasonable limits. The hole in the macaroni makes it possible to have a form with a large outside diameter that will dry uniformly and cook properly. Both products are formed by forcing dough under hydraulic pressure through a cylinder with a flat, circular bronze die at the bottom.

The other forms of macaroni products are dried in various ways, but macaroni and spaghetti present the most intricate problems which, when solved, may be applied with modifications to all forms.

Prefacing this discussion of drying, it is interesting to quote from a conversation with a prominent European manufacturer as recorded in a little booklet by Albert F. Woods, dated Feb. 7, 1902, because it emphasizes the problems which confront the manufacturer and illustrates the European idea, prevalent to this day, that the mysteries of macaroni drying belong to a cult whose carefully guarded secrets are sacrosanct to the chosen few. As quoted: "This curing of macaroni is the most delicate feature of the business. I believe it takes about twenty years to get a factory in running order. To know exactly when the macaroni is 'ripe' and ready for the market amounts to an intuition. It is absolutely impossible to establish cut and dried methods. Personal experience must be the only guide. It is right at this point, in my opinion, that the first efforts to manufacture macaroni in the United States have not succeeded. The promoters have not had sufficient patience in going about their work. They have expected to accomplish in a few years that for which we have required a lifetime of labor. I have seen some American macaroni, and my main criticism on it is that it is not solid, though in every other respect it leaves something to be desired. If macaroni is permitted to 'take cold,' as I may express it, during the drying process, in spite of its condition as respects the quantity of gluten and the duration of the kneading process, it lacks the elasticity which a perfect macaroni should have. When the product is properly cured, one should be able to take a section a meter long, and, holding it up by the end, it should bend readily like a whip, without breaking. The same macaroni improperly cured will break; it will break before cooking and it will still be more brittle after having been cooked. This elastic quality causes the macaroni after cooking to retain its original form, desired by all lovers of the food, while the inferior article melts together and becomes more like paste."

The remark of the European manufacturer that "American macaroni in every respect leaves something to be desired" might have been true in 1902, but it most certainly is not true today. It has been found by experimental research that the curing of macaroni depends almost entirely upon the proper rate of removal of the moisture from the product. To best understand the process it is necessary to recall that macaroni is a mixture of semolina, or wheat flour, and water, mixed and kneaded into a cohering mass and formed under a pressure of 3,000 to 5,000 lb. per sq.in. Semolina originally contains about 14 per cent moisture and 26 per cent of water is added in the mixing. Properly dried macaroni contains about 10 per cent. Thirty per cent must be removed in such a way that the macaroni does not lose its form but becomes hard or flintlike in structure and retains its light amber color. When the product is subjected to hot, dry air the rate of interchange of moisture between the macaroni and the air is so rapid that it tends to crack. If the high rate of drying is continued it will lose its form and disintegrate. On the other hand, if the rate of drying is too slow, the macaroni sours or becomes moldy.



Humidifier used in macaroni drying installation, showing circulating fan, water tank, spray chamber, centrifugal circulating pump, and return air duct

A blast of hot, dry air passing over an exposed moist surface rapidly absorbs the moisture from that surface. Air containing all of the moisture that it will absorb when passed over the same surface will make no change in the dryness thereof. The main problem is to expose the surface of the macaroni to air of that degree of humidity which will allow an interchange of moisture between the surface of the macaroni and the air at a rate no greater than the interchange of moisture from the interior mass of the product to its surface.

There seems to be a very definite rate of travel of the moisture from the interior of the macaroni mass to the surface. Under the same conditions of humidity and rate of circulation of air, macaroni or spaghetti dries at a rate corresponding quite closely to the thickness of the strand and to the surface area exposed to the air. In order to visualize this it is well to think of the macaroni as being made up of an infinite number of concentric layers. When the surface is exposed to the dry air the infinitely small outside circle immediately gives up its moisture to the air and absorbs moisture from the layer beneath it. The process goes on until the whole structure is dry, provided the outside layers are not dried at a rate which causes them to become hard before the moisture of the inner mass is absorbed.

Macaroni contracts as it dries, and if the rate of drying is so rapid that the outside becomes hard and dry before the interior is brought to the same state of dryness, there is a tendency for the contracting outer layers to compress the plastic interior, with the result that when the interior finally becomes dry and hard it in turn contracts and causes the outside structure to crack because it has no resilience.

The reason that the European manufacturer, quoted above, felt that it takes twenty years to develop the intuitive sense necessary to cure macaroni properly was because of his lack of understanding of the principles involved. The Neapolitan who dried macaroni on the housetop depended upon the whims of the atmosphere. In this country such outside drying would be impossible, because of wide and quick variations of temperature and humidity. It is possible in Naples because of the uniform balmy climate. The moisture-laden sea breezes have about the right relative humidity to extract uniformly the moisture from the macaroni without causing it to break to pieces. Experience taught the manufacturer to sense by feeling the macaroni when the rate of drying was too rapid. To protect his product he would remove it from the roof to an interior closed room and allow it to "sweat" until the moisture from the inner mass of the product was absorbed by the surface and a uniform moisture content obtained throughout. He would then take it back to the housetop and subject it to the breezes for further drying. The result was that ten days to two weeks was required to cure it properly.

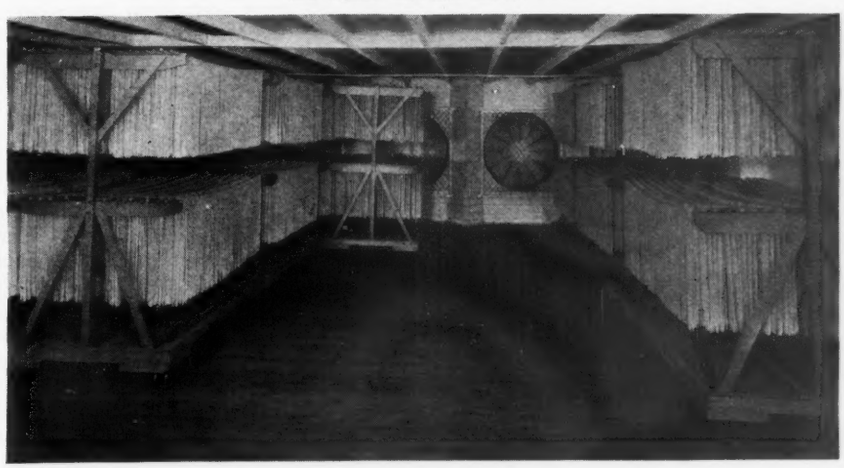
The modern scientific drying system concentrates the process into 48 hours by regulating the relative humidities and temperatures so that the air which is circulated over the product has a definite moisture content and will cause a rate of interchange which results in uniform drying. Properly dried macaroni should be so strong that it cannot be twisted in two between the fingers, and when broken straight across by bending it has clear, glass-like ends.

Tests show that, starting with an initial moisture content of 40 per cent in the dough, 11 per cent is lost in the mixing, kneading and pressing operations. In the manufacture of long goods, known under the specific terms macaroni, spaghetti and vermicelli, the drying sticks on which the product is hung are transported on racks to a "fanning" room, where the macaroni is subjected to hot, dry air circulated at a high rate of speed for about 20 minutes, during which time another 5 to 6 per cent of the total weight is removed. At the end of the fanning period, the macaroni is still soft but is very brittle. It has become "case-hardened."

From the fanning room it is taken to the drying chamber in which no air is circulated for 1 or 2 hours, during which time the interior moisture becomes uniformly distributed throughout the mass of the macaroni and the strands again become plastic. This operation is commonly termed "sweating." This sweating may be hastened by saturating the air in the sweating room at high temperatures. When sweated in saturated air there is no change in weight, which proves that the moisture in the product diffuses uniformly, giving up no moisture to the air.

One efficient system of drying involves mechanical equipment consisting

Drying room in which three 42-in. disk-type fans circulate air through spaghetti back over a false ceiling through steam coils and again through macaroni.



of a humidifying chamber, steam coils for heating the air, and a large fan to produce circulation. The air is introduced into the drying compartment by nozzles 6 in. in diameter, spread 20 in. apart and projecting into the compartment about 3 ft. below the ceiling. These discharge air at high speed above the drying racks. The air is returned through the macaroni to the humidifier.

The base of the humidifier is a metal tank 10 ft. long and 5 ft. wide, in which water is carried at a depth of about 1 ft. The water from this tank is forced by a centrifugal pump through nozzles which break it into a fine spray, through which the return air passes. This water is kept at a uniform temperature of about 90 deg. F. by an automatically regulated steam jet discharging into the tank. After passing through the spray the air is forced by the circulating fan over steam coils, where the temperature is raised to give the relative humidity desired.

This is the Carrier ejector system. It is not in common use but is the most perfectly controlled system yet developed and serves best to illustrate the conditions necessary to proper drying. A more common type of the better drying room, in which approximately the same regulation of conditions is obtained, has fans located in one end of the room, circulating air through the goods, through steam coils, back over a false ceiling, and again through the goods. The preliminary fanning and sweating process is carried out as in the first system described; but in this drying system, instead of introducing moisture from a humidifier, the moisture which is given up by the product is retained in the room to regulate the relative humidity of the circulating air, and dry air from outside the room is introduced at such a rate as to replace and dry out the circulating air to the humidity desired at the various stages.

The theory behind the construction of this drying equipment is based on an understanding of the properties of air. The basic premise is that, since drying is carried on by the absorption of water into air and since the absorbing quality of air can be measured, it is possible to predict definitely a rate of transfer of moisture from macaroni to air.

The old school still stubbornly maintain that macaroni cannot be properly dried at high temperatures. In some plants the use of steam coils for heating is considered detrimental to the product. On muggy days in summer they fret and worry because the goods will not dry fast enough to keep them from souring or molding. In winter the drying rooms are protected from cold blasts with great solicitude. Without definite humidity and temperature control the macaroni must be subjected to alternate periods of fanning and sweating if the air is dry, or allowed to sour or mold in periods of long-continued high humidity.

There are four fundamental influences at work in the process of drying: condition of air, heat, rate of circulation of air, and rate of diffusion of moisture in the product to be dried.

Condition of air is best determined by psychrometric readings with a wet and dry bulb thermometer. The dry bulb thermometer registers the temperature of the air as commonly expressed and the wet bulb thermometer indicates the deficiency of moisture in the air. The difference between the dry and wet bulb reading is known as wet bulb depression and is a measure of the drying power, which increases directly with the depression, other conditions being equal.

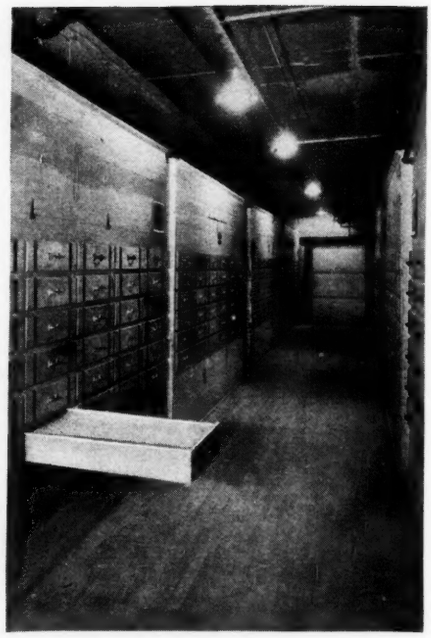
Heat increases the drying speed when other factors are unchanged. For

Drying Schedule

Time. Hours from start of fanning	Dry Bulb	Wet Bulb	Wet Bulb Depression	Net Weight of Macaroni	Loss in Weight: Pounds	Loss in Weight: Per Cent
0:00*	...	...	...	388	..	....
0:02	120½	87	33½	387	1	0.3
0:04	120½	87	33½	385	3	0.8
0:06	122	87	35	383	5	1.3
0:08	122	87	35	381	7	1.8
0:10	120	86	34	379	9	2.3
0:12	118	86	32	377	11	2.8
0:14	118	86	32	375	13	3.4
0:16	120	87	33	373	15	3.9
0:18	118	85	33	371	17	4.4
0:20	118	86	32	369	19	4.9
0:22	118	85	33	367	21	5.4
Moved to drying compartment in which air is near saturation with no circulation						
0:30	95	93	2	364	24	6.2
1:00	95	93	2	364	24	6.2
2:00	95	93	2	364	24	6.2
Circulation of air started						
2:30	97	93	4	362	26	6.6
3:00	97	93	4	360	28	7.2
4:00	97	93	4	358	30	7.7
5:00	96½	92½	4	356	32	8.2
6:00	96½	92	4½	355½	32½	8.3
7:00	96	91½	4½	353	35	9.0
8:00	95½	91	4½	351	37	9.5
9:00	95	90½	4½	350	38	9.8
10:00	95	90	5	348	40	10.3
11:00	95	90	5	345	43	11.1
12:00	94½	89½	5	343	45	11.6
13:00	94½	89½	5	340	48	12.4
14:00	95	90	5	338	50	12.9
15:00	95½	90	5½	337	51	13.2
16:00	95	89½	5½	336	52	13.4
17:00	95½	89½	6	335	53	13.6
18:00	96	90	6	333½	54½	14.0
19:00	97½	91	6½	332½	55½	14.3
20:00	98	91½	6½	331½	56½	14.5
21:00	98	91½	6½	330	58	14.9
22:00	98	91	7	328½	59½	15.3
23:00	97½	90½	7	326½	61½	15.8
24:00	97	90	7	325½	62½	16.1
25:00	97	90	7	324½	63½	16.3
26:00	97½	89½	8	322½	65½	16.8
27:00	97½	89½	8	321	67	17.2
28:00	97½	89½	8	320½	67½	17.4
29:00	97½	89½	8	320	68	17.5
30:00	97½	89½	8	319½	68½	17.6
31:00	98	90	8	318	70	18.0
32:00	98	90	8	318	70	18.0
33:00	98	90	8	318	70	18.0
34:00	99½	90½	9	317	71	18.3
35:00	99½	90½	9	317	71	18.3
36:00	99½	90½	9	316½	71½	18.4
37:00	99	90	9	316½	71½	18.4
38:00	99	90	9	316	72	18.5
39:00	99	89½	9½	315½	72½	18.6
40:00	99	89½	9½	315	73	18.8
41:00	99	89½	9½	315	73	18.8
42:00	99½	90	9½	315	73	18.8
43:00	100	90	10	314½	73½	18.9
44:00	100	90	10	314½	73½	18.9
45:00	100	90	10	314	74	19.0
46:00	100	90	10	314	74	19.0
47:00	100	90	10	314	74	19.0
48:00	100	90	10	314	74	19.0
Circulation of air stopped						

*Hours—minutes.

Goods:— Macaroni, 28 sticks to rack.
Weight per stick, approximately 14 lb.
Length of strand, 32 in. doubled over drying stick.
Size of strand when dry, 0.190 in. outside diameter; 0.099 in. inside diameter.



A short-goods or elbow macaroni dryer

purposes of discussion it is assumed that the initial rate of evaporation of moisture from the surface of the macaroni is practically the same as the rate of evaporation from a free liquid surface, such as an open pan. Molecules of water are constantly in motion, varying in intensity and magnitude with temperature. This movement of water molecules creates a definite pressure or force acting against the mutual attraction of the molecules, tending to cause their separation. This pressure within a body of water is vapor-pressure.

The molecules near the surface, due to their movement, will have a tendency to leave the body of the liquid and pass away in the form of vapor. If the vapor pressure of the moisture in the air is less than the vapor pressure of the moisture in the macaroni the moisture will leave the surface of the macaroni. The rate of evaporation varies directly with the difference in vapor pressure and, since the vapor pressure varies with the heat, it is evident that heat will tend to increase the rate of evaporation.

In order for evaporation to continue there must be a difference between the vapor pressure in the air and in the macaroni. If there is no circulation, the air above the macaroni will give up heat to supply the heat of evaporation of the moisture from the macaroni and equilibrium will be established. Consequently circulation is necessary in a dryer. If the supply of heat is constant and the water vapor is carried away by the air as it leaves the surface, the rate of evaporation will increase with air velocity.

In the foregoing discussion it has been assumed that evaporation took place from a free-moisture surface. However, in macaroni drying the case is more complex. The rate of evaporation is limited by the rate of diffusion;

that is, by the rate at which moisture will flow from the interior to the surface. There is a rate of diffusion for every temperature; and in the earlier stages of drying, a balance must be maintained between the factors of humidity, temperature and air velocity that will not dry the surface faster than the moisture from the interior is diffused to the surface.

The table given herewith is an actual drying schedule developed by experiments and used in the Carrier ejector drying system. In this system the four factors which influence drying may be closely controlled. The temperatures shown are used because they are above any atmospheric conditions that may be experienced. Consequently, weather has no influence on the operation of the equipment, and the maximum temperature, while slightly uncomfortable, is bearable by employees.

The schedule of drying shown covers: (1) The fanning period, during which very dry air, at high temperature, rapidly removed the moisture. In 22 minutes 5.4 per cent of the total moisture was removed. If macaroni is placed in the drying room without fanning, it will stretch. The quick drying of the fanning period prevents this. (2) The sweating period, during which the goods were placed in the drying room to sweat at high temperature in air near the saturation point. There was no loss or gain of weight, but the macaroni, which was brittle and "case-hardened" at the end of the fanning, became flexible and moist on the surface. (3) The actual drying schedule, which started with air circulating at 4 deg. F. depression and ended at 10 deg. F. depression. From this drying schedule the accompanying curves have been drawn.

The drying speed may be increased by shortening the length of time the goods are left at a given depression, provided it is possible to expose every strand of macaroni to that same air condition. The room in which this drying schedule was used contained 6,000 lb. of macaroni occupying 1,700 cu.ft. Air coming in at a given depression first contacted the strands at the rear of the room and as it passed back to the return duct picked up moisture, so that the trucks in the front of the room were subjected to smaller depressions until the end of the drying period, when equilibrium was reached at 10 deg. F. depression, at which point, after four hours at 10 deg. F., it was found that the air circulating in the room had a uniform depression for every part of the room, which was proof that the macaroni was no longer giving up moisture.

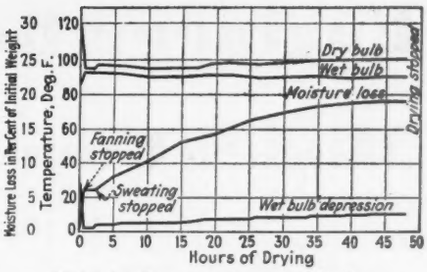
The more common type of drying room may be used because of the knowledge gained by use of the Carrier system; but this type of room cannot be controlled so closely and while quite generally successful in drying spaghetti is less suitable for macaroni.

In the short-goods macaroni dryer the product is loaded about 4 in. deep in trays 2x5 ft. A fan in the center of the compartment circulates air through the goods. Steam coils are used to heat up the goods and the air, and increase the depression. The moist air is exhausted and dry air inducted as in the common long-goods dryer.

There is another factor which influences the rate of drying of macaroni—namely, density of the product—but this influence has not been definitely determined and therefore has not been discussed in this article. However, the cross-sectional mass of the product as compared to the surface area exposed to the air has a decided bearing on rate of drying. Noodles, which, because of their method of manufacture, are not so dense as macaroni, and because the relation of surface area to weight is greater than macaroni, will dry more rapidly. The air in the large room in which this noodle dryer, shown in the illustration, is located is kept dry and the moisture from the goods themselves is depended upon to hold back the drying rate.

It is a coincidence that with a dry bulb temperature of 100 deg. F. and a wet bulb depression of 10 deg. F. the moisture in macaroni products is in a state of equilibrium at about 10 per cent. Increase in depression with constant dry bulb temperature causes further drying, and decrease in depression causes the macaroni to take up moisture. The moisture content at which equilibrium is established is known as the critical moisture of the product.

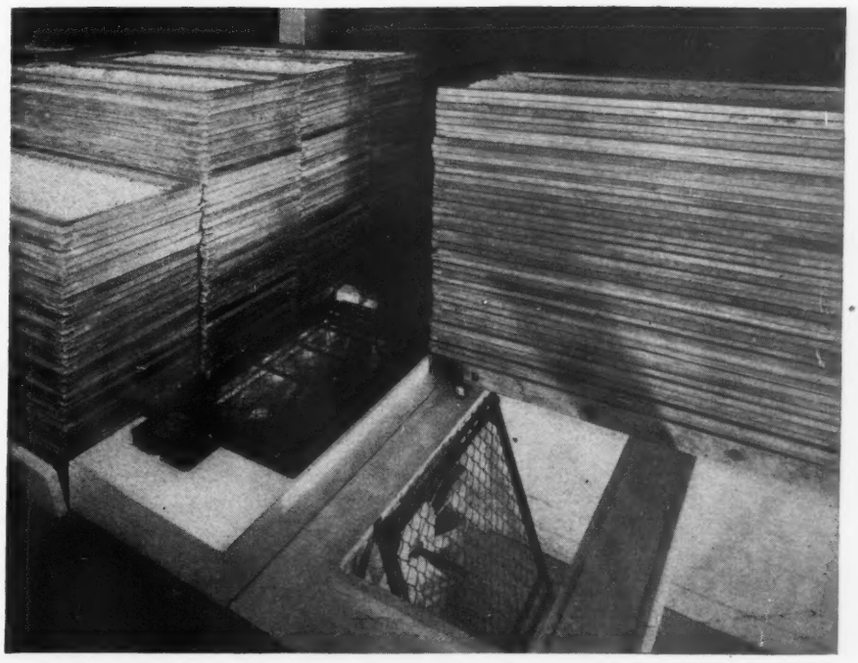
When macaroni containing moisture is subjected to circulating air at 100 deg. F. dry bulb and 90 deg. F. wet bulb, the macaroni is heated to approximately 100 deg. F. and as a consequence the moisture within the macaroni is heated to 100 deg. F. At 100 deg. F. the vapor tension is 1.88 in. of mercury. Diffusion of moisture in the macaroni brings a portion to the surface. At the surface it is subjected to a pulling power by the 10-deg. F. wet bulb depression, which causes evaporation and cools the surface shell to the wet bulb temperature of 90 deg. F., at which temperature vapor pressure in the moisture is 1.39 in. This sets up a moisture differential between the exterior of the macaroni and the interior. The dew point of the air at 100 deg. F. wet bulb and 90 deg. F. dry bulb is 87.5 deg. F. and the vapor pressure corresponding to this dew point is 1.31 in. Therefore the moisture on the surface of the macaroni, having a higher vapor tension than the moisture in the air, will leave the surface and become absorbed by the air. This action will go on as long as the condition of the air is kept constant by circulation or until the critical moisture content corresponding to these conditions is reached. This critical moisture content is the point at which the pulling power of the surrounding air is in equilibrium with the moisture-retention power of the macaroni.



Moisture loss in macaroni drying

Acknowledgment is made of the assistance of E. P. Heckel, of Carrier Engineering Corp., for his helpful discussion of the theory involved in drying macaroni.

Below—Noodle dryer in which two 36-in. disk-type fans circulate air through stacks of noodles placed on Monel metal trays



Engineer Designs Model Cocoa Syrup Plant

In working out the details of this plant F. C. Schoening, *Plant Engineer, Van Houten, Inc., New York, N. Y.*, has discarded haphazard methods of developing a plant through growth stages. It was a planned, complete unit from the beginning of construction

TO LAY out and install a plant of a definite capacity for manufacturing and processing chocolate syrup presents many problems of an engineering nature. This is particularly true when a fully modernized, sanitary, and economically operating plant is to be fitted into a fixed floor space in a building not entirely suited for present-day manufacturing purposes. Some of the restrictions with which the designer of such a plant has to contend include: inadequate floor space to accommodate machinery, materials, and finished product; too low headroom for installation of machinery drives and for proper material handling; and wooden floors that must be waterproofed.

This syrup plant was planned for this particular location because of its relation to the general office and warehouse, and because the company had already established a cocoa-packing plant on the floor above, which could be used for storing, sifting, and blending the raw materials and for the storage of empty cans.

After making several layout studies the plan shown herewith was the one adopted as the most suitable for a plant whose output would be 2,000 gal. per 8-hour day. Provision was made for the addition of more kettles if a marked increase in output should be desired. This plan provides for continuous and progressive flow of the product and its arrangement is economical with respect to floor space occupied as well as to ease of control, supervision and operation.

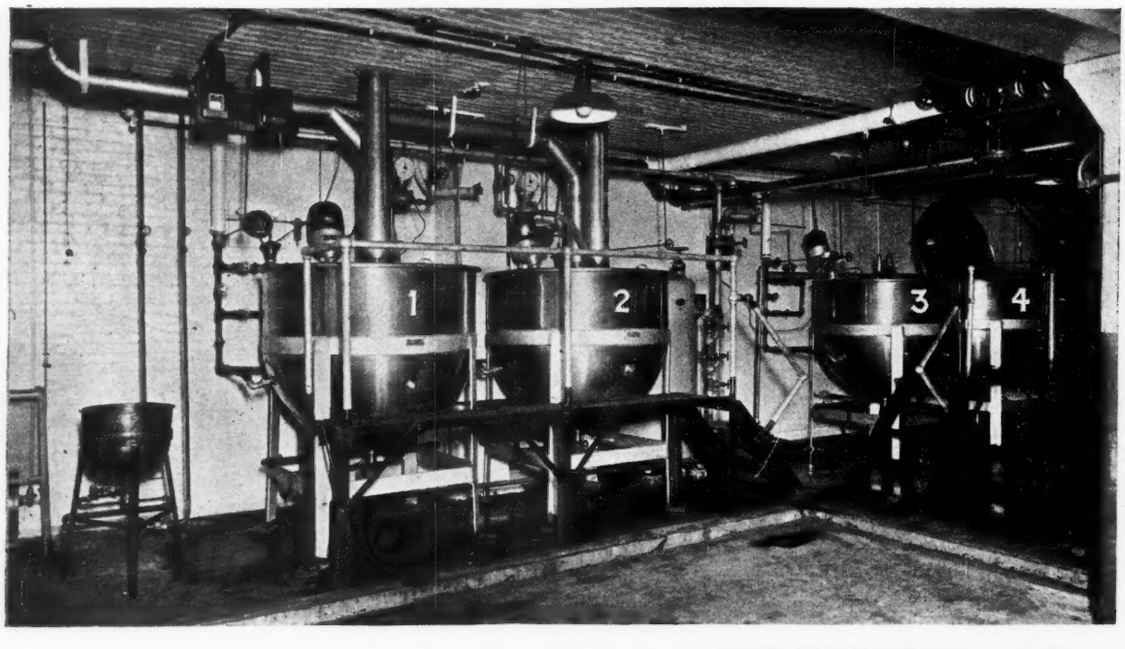
The cocoa powder and refined cane sugar for each batch are sifted and discharged through metal chutes into a steam-jacketed mixing kettle, No. 1 or No. 2, to be mixed with measured quantities of filtered and softened water. During the mixing operation the batch is brought to a predetermined temperature preliminary to being pumped by means of a centrifugal pump into a steam-jacketed cooking kettle, No. 3 or No. 4, where it is processed for a predetermined time at a definite temperature. During the course of all mixing, cooking, and holding-tank operations the syrup ingredients are kept in constant agitation by "Lightnin" mixing or agitating units.

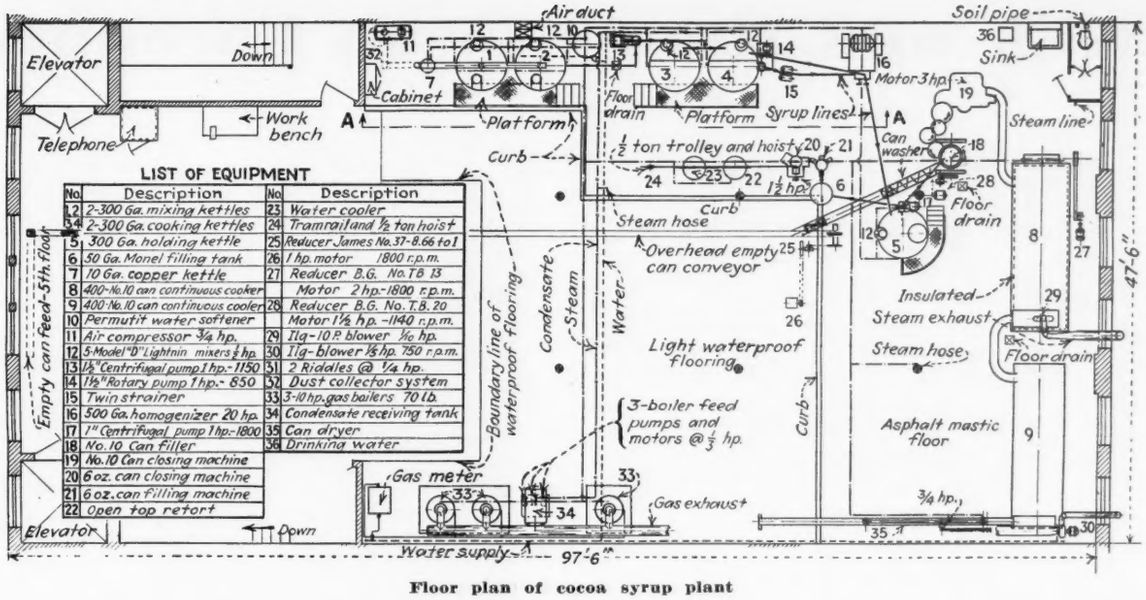
From the cooking kettles the syrup is pumped by means of a rotary pump through a twin strainer made of fine-mesh wire screen. It is then converted into a product of maximum smoothness and complete emulsification by means of a double-stage homogenizer. The homogenizer pumps force the syrup into a steam-jacketed holding tank in which it is kept at constant temperature and density and whence the finished syrup is pumped to an automatic filler. The supply tank of this filler is kept at a constant level by means of a float in the tank. This float operates a Mercoid switch which automatically activates the pump motor to the filling machine. The No. 10 sanitary cans are cleaned and sterilized as they pass through the can washer on their way from the can conveyor onto the filler.

The movement of the syrup-filled cans is continuous, as they pass from the filler to the automatic double seamer or closing machine, to which is attached a marker for identifying the syrup as to grade and date. An elevator feeds them into the agitating hot-water sterilizer, from which they pass into the agitating cold-water cooler and through a dryer.

Throughout all the operations provi-

View of plant showing mixing and cooking kettles





Floor plan of cocoa syrup plant

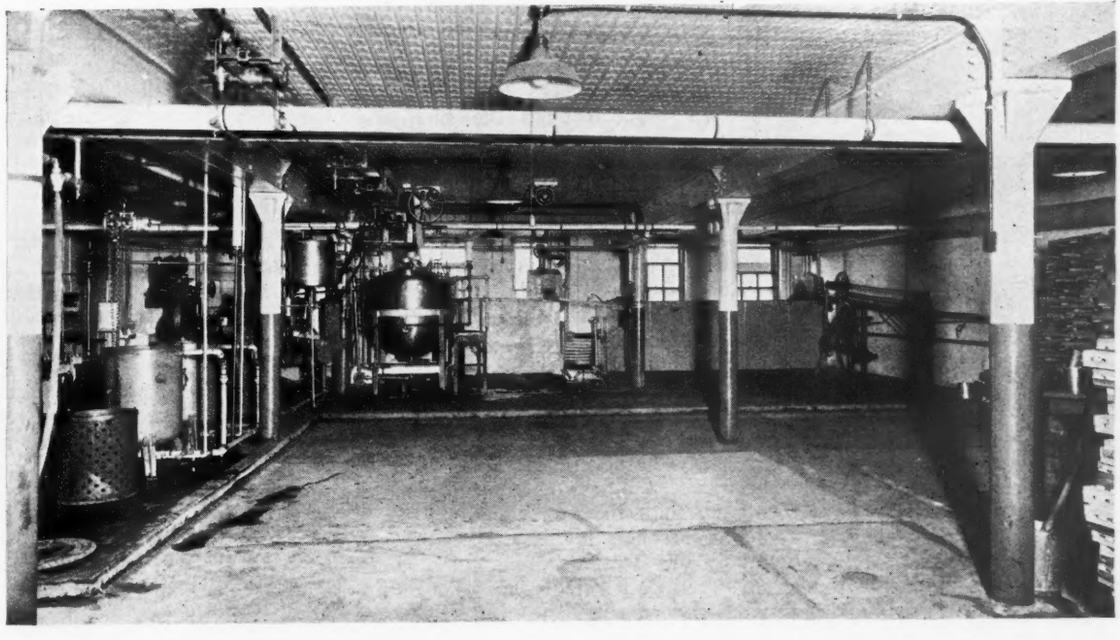
sion is made to preserve the flavor and aroma of the cocoa as well as to give sterile and sanitary handling of the syrup. Temperature control and recording instruments are used on kettles, holding tank and sterilizer. Sanitary nickel-alloy tubing and fittings, which can be taken apart, thoroughly cleaned, and sterilized with steam are used in the syrup lines. Kettles, pumps, mixers, and valves are of Monel metal and can readily be kept clean. Even the kettles have specially made covers so that they can be kept covered without interfering with processing operations.

Obviously, in a plant of this nature, where water has to be used freely for washing and cleaning purposes, the plant could not be set on the original maple-wood flooring; especially since fancy groceries, labels, and similar perishable merchandise were stored on the floor below. Not only was waterproofing and satisfactory drainage necessary but the floor had to support large tanks, kettles, and other machinery whose operations produced considerable vibration.

To accomplish the desired results a special, reinforced concrete foundation and beams were installed for the support of the heavy machines and tanks; asphalt mastic was used for waterproofing. Before the mastic was applied the floor was covered with a waterproof sheeting over which was placed a cinder-concrete grading base with a thickness varying from 2 to 4 in. pitched toward the three floor drains. The 1-in. layer of asphalt mastic was applied hot to this base and allowed to harden. Drain pipes were laid under the floor and connected with an available soil pipe. The rest of the floor space in the production area was covered with a light plastic waterproofing layer $\frac{5}{8}$ in. thick to prevent condensate drippings from overhead pipes or an occasional splash of water from seeping through the floor in the middle of the room.

Other important points of interest include: steam production by three 10-hp. gas-fired boilers operating up to 75 lb. pressure to give all the steam desired—the pressure for the kettles is reduced to 40 lb.—individual motor drives connected directly or by belt to suitable speed reducers for all machines; desired degree of illumination by placing 200-watt lamps to give about 12 foot-candles in the production area with 4 to 6 foot-candles for the remaining area, which is used for storage or passageway purposes; and the installation of a dust collecting system over the mixing kettles, not only to keep the finely divided cocoa powder dust from being a nuisance to the workers but also to prevent wastage.

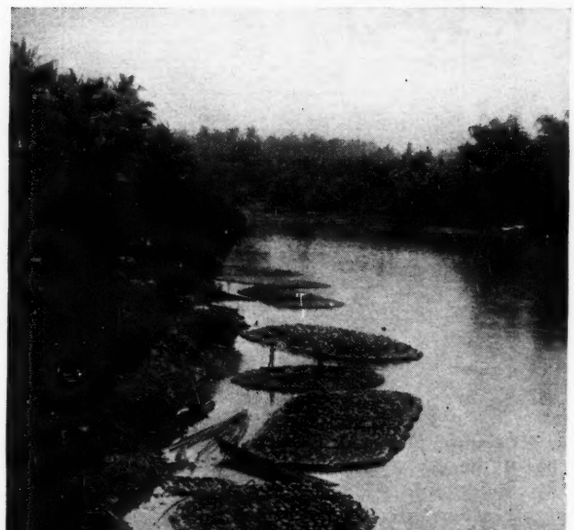
View showing filling and processing equipment



Milk and Honey From Coconuts

By JANET M. WALKER
Tropic Products Co.
Manila, P. I.

Coconuts, through scientific methods guided by market sense, yield new beverage, syrup, fountain flavor, candy center, and cake filling.



Coconuts are rafted downstream to Manila

JUST as the date palm of northern Africa has played an important rôle in the lives of Egyptian, Moroccan, and Arabic races, so the towering coconut has for centuries been a boon to tropical peoples. With its crop of nourishing fruit, its fibers, leaves, and wood for building materials, it has come to be almost a fundamental condition of existence itself to the more primitive tribes and a source of income to those more advanced in the ways of civilization. It can even furnish a highly intoxicating liquor whenever the primitive, but skilled, home brewers set themselves to the task.

In the countries of the more northern latitudes the coconut as such is rarely met with; its thick husk and hard, rough shell make the winning of the edible portion a formidable task, though the sweet and delicately flavored "meat" usually is liked once it is obtained. The popularity of shredded coconut in confectionery or pastry is well known. Coconut oil obtained from the dried meat or copra, is much used in the manufacture of shortenings and oleomargarine as well as in certain kinds of soap.

The coconut is indigenous to most tropical countries that front on the sea. It flourishes particularly in the islands of the south Pacific Ocean and is a highly important source of income to some of them. From the Philippines, for instance, in 1928, the United States imported something over 300,000 tons of coconut products—oil, copra, and edible meats—valued at $43,500,000. This was almost as much as the value of the sugar crop of the Philippines for the same year.

Few who have not been in the tropics really know the delicate flavor of a freshly gathered coconut. Drying changes its flavor, just as the flavors of other fruits and vegetables are changed by dehydration. The change begins with the removal of the outer husk (coir fiber). The shell is not entirely airtight, and the meat changes in texture and flavor through oxidation. The outer husks are removed as soon as the nuts are gathered, to facilitate transportation. The fiber of the husk usually is 2 in. thick, and protects the nut as it falls from the tree.

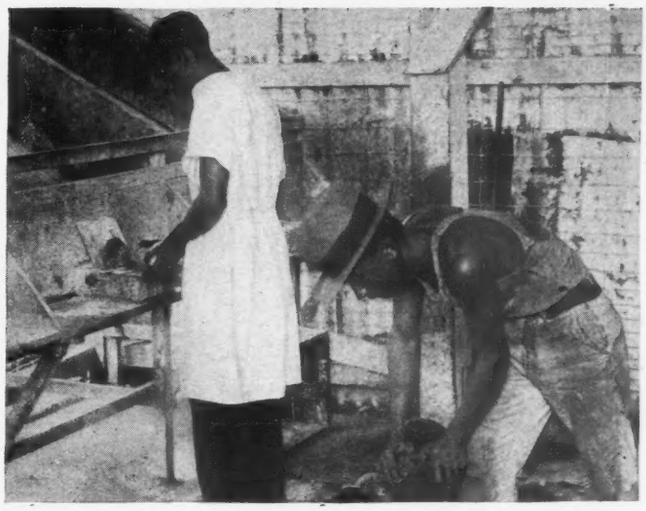
Coconuts reserved for propagation are not removed from the husk, and are laid in shallow trenches that serve as seedling beds. The husk prevents evaporation of moisture while the embryo, or *tombong,* is forming. Before the embryo entirely fills the shells (feeding upon the stored up fats, sugars, and proteins), the sprout, or palm, pierces through it. When a vigorous growth is assured, the young palms are taken from the seedling beds and planted. At this stage the embryo has sent its roots through the shell and husk in long rope-like strands. The new trees are set out from 30 to 60 ft. apart. If given insufficient spread, the fronds, which average about 20 ft. in length, can do considerable damage to near-by trees during typhoon seasons.

Subject to soil conditions and subterranean waters, the average tree begins to blossom in from six to eight years. Long, knobby stems terminate in an acrid bloom. The flowering stems bear quite a resemblance to those of the date palm and furnish the natives with an enjoyable beverage. Tubes of bamboo, tied to a freshly tapped stem, fill rapidly with the sap, which, in a few hours, becomes highly carbonated and mildly intoxicating. This juice, called *tuba,* ferments rapidly and the Philippine government discourages its sale after it is 24 hr. old. Trees set aside for making this native drink do not bear fruit and are shorter lived than those that are allowed to grow normally. When the palm is cut down the heart, or *obud,* is eaten in salads. The embryo, *tombong,* is also eaten as a vegetable or in salads. It frequently begins to form in mature nuts while they are yet on the tree.

When the young fruit first appears it consists of a white, astringent tasting, fibrous mass, which afterward is destined to form the husk; and of a thin, green outer skin. The nut gradually increases in size until it is about 3 in. in diameter. It then has a small cavity in the center which is completely filled with an astringent, watery fluid. A rudimentary shell is formed around the inner surface of the nut; at first very thin and soft, but slowly becoming thicker and harder. Not until the nut has reached its maximum size is there any indication of meat or of oily material. Gradually the water changes in character, becomes rather sweet, and a gelatinous mass begins to deposit on the lower half of the nut, finally covering the entire surface. As it grows thicker and denser, it increases in oil content at the expense of sugar in the "milk," until it assumes the well-known characteristics of coconut meat. When the embryo makes its appearance in the ripe nut, the reverse of these changes takes place. The stored up fats are transformed into sugars and other bodies capable of being directly assimilated by the young plant.

The nuts from a healthy tree mature

Forming the bamboo cases used for shipping the syrup made from fresh coconuts



Husking and peeling the brown skin from the meats

in from ten to twelve months, each tree bearing from 50 to 200 nuts a year. The coconuts vary in size from 500 grams to 2 kg. or more, including the husk. Those grown in the southern provinces of the Philippines are very much larger than those from Luzon, where the capital, Manila, is located. Occasionally a nut is harvested that, on account of its extreme weight, is culled from the others. These freaks are called *makapuno* and are almost solid, with a rich white meat that is as soft throughout as cream cheese. They are much sought after by the natives and are used for making ice cream and sweets. So far, no explanation has been found for this unusual growth.

The average life of a coconut palm is about twenty years. A tree is fully matured at ten years; little difference in the yield is noted until about the thirtieth year. At this age the trees are so tall (about 90 ft.) that cutting down the nuts is very difficult.

There is no set time for harvesting, as the trees bear all the year around. When the fronds are long and dense enough to shade the ground, the trees need very little attention. Few owners supervise their own plantations; instead, the bearing trees are rented out by the year at from 50c. to $1 each. One estate only, situated at Canlubang, Languna province, really takes care of its trees according to modern agricultural methods. It belongs to a sugar company and is reputed to be the largest single grove of coconuts in the world. A far-seeing manager, seeking to utilize land unfit for planting to cane, started this grove, which promises to be of as great a value as the sugar grown on the remainder of the estate. Most of the nuts from these trees are used in making shredded coconut.

Shredded coconut, or desiccated coconut, was first manufactured on the island of Ceylon. The first factory in the Philippines was erected in 1920; it laid the foundation for a large industry. In that year 2,000 kg. of shredded coconut was exported. In seven years this had increased to 40,000 kg., a 2,000 per cent increase.

Hitherto, shredded coconut, copra, and coconut oil have represented the principal food products derived from coconuts. Recently, however, some new preparations made from fresh coconuts have been placed on the market in Manila. One of these, a milk-like product, was designed for tropical consumption and is unlikely to appear elsewhere. Others in the form of pastes made from fresh coconuts, for confectioners, bakers, or ice cream makers, can be made available anywhere in the world where the flavor of the coconut is known and enjoyed.

If the meat of fresh coconuts is pressed an emulsion is forced out of it that bears a remarkable outward resemblance to cream from cows' milk. In composition it is approximately as follows:

Water	56.3 per cent
Total Solids	43.7 per cent
Ash	1.2 per cent
Fat	33.4 per cent
Protein (Nx6.25)	4.1 per cent
Total sugar (invert)	5.0 per cent

Sp. gr. at 30 deg. C., 1.012

(Walker, H. S., *Phil. Journ. of Science*, 1,132; Feb. 1906).

It will be noted that the emulsion is richer in fats and poorer in solids-not-fat than is cows' milk. It has much the same viscosity as table cream. The proteins coagulate at a much lower temperature than do those of milks, and when the emulsion sours, the resulting curd takes the form of a soft, flocculent mass.

It will be noted that the foregoing analysis was made over twenty-five years ago, in connection with some studies of the drying of coconut meat. Its significance for the preparation of a milk-like product, in a land where milk is scarce and expensive, appeared many years afterward. Its resemblance to cream was noted at the time and the comment made that, "it approximates in nutritive properties . . . a rich, natural cream; it is very pleasant and sweet to the taste, possesses an agreeable odor and, when sterilized and properly sealed, will remain indefinitely in a fresh condition. Such a product could be used as a substitute for all of the purposes to which the so-called 'evaporated creams' now on the market are put . . . " (Walker, *op. cit.* p. 133).

The natives of the Philippines utilize the coconut as a food in numerous ways. One particularly delicious product, called by them *Matamis-sa-bao,* meaning "sweet in the shell," is prepared by shredding fresh coconut by hand, over a fork-like prong attached to a low bench, astride which the worker sits. As the meat is scraped from the shell it falls into a pan or basket at his feet. The shredded meat is then pressed by hand and the resulting emulsion boiled into a syrup with native

Husking the coconuts. Note the bayonet-like spike used to pierce the husk and to remove it. Delivery truck in background

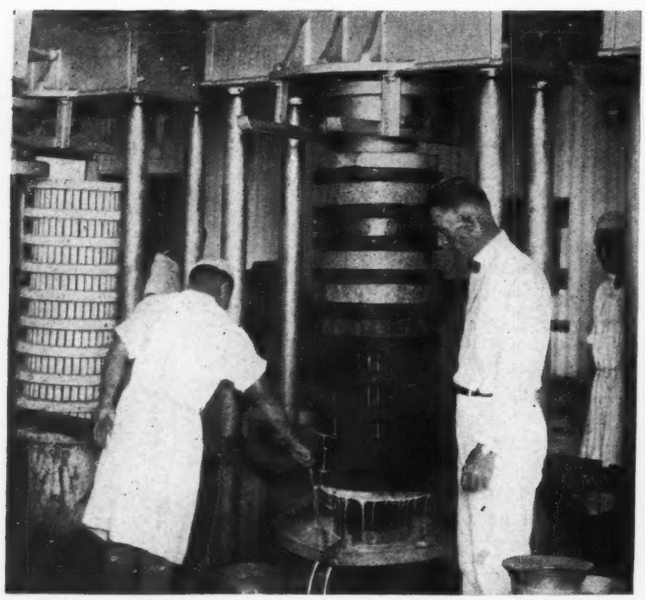
Cracking the shelled nuts. By hitting them with a hammer having a spike-like head, the nut is made to split into two irregularly shaped halves from which the meat is removed with a kn'fe

sugar. It is usually served in coconut shells shortly after making, or presented in tubes of bamboo as holiday gifts.

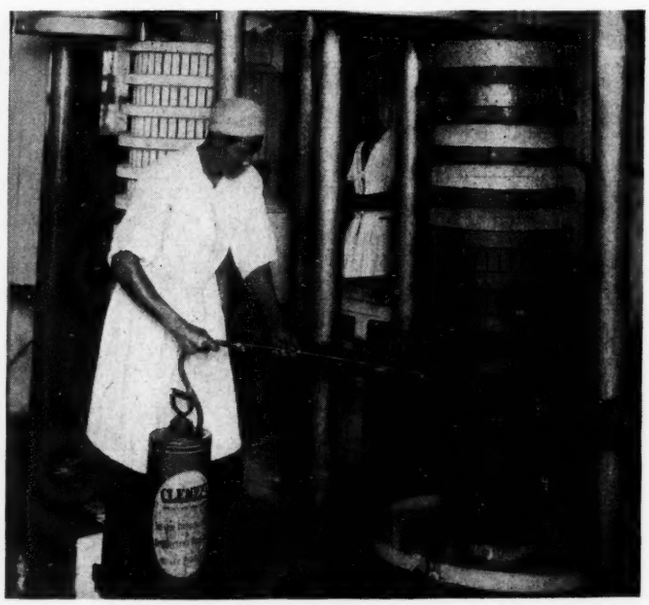
Herbert S. Walker, then supervising sugar technologist for the centrals on the Island of Negros, was attracted by this *dulce* of the native fiestas and took some home with him. He found that the native product had very poor keeping qualities. On standing a few days, the fat separated from the syrup an turned rancid. In attempting to duplicate the syrup—for its delightful flavor made it a likely possibility for export trade—an unexpected discovery was made. The first experiments were unsuccessful and the residues from them, useless as syrups though still palatable mixtures, were given to the servants and houseboys, who fed them to their children. These youngsters soon began to outstrip their playmates in weight and growth, and on inquiring into the reasons, it seemed possible to attribute it only to the coconut products they had been consuming.

The prediction made years before and quoted above was recalled and the syrup experiments were sidetracked for the time being. Experimentation showed that diluting the emulsion pressed from the meat with the natural water present in the nut to a point where the fat was somewhere in the neighborhood of the percentage in cows' milk would result in an excellent "vegetable milk." The commercial possibilities were evident in a land where dairy herds were scarce, on account of lack of forage and climatic conditions, and cows' milk retailed for 25 to 50c. a quart. The "coconut milk" could be made and sold for 10c. a quart. Its nutritional value was proved in 1929 when a report of the Philippine Public Welfare Commission recounted a clinical experiment on children, a part of whom received the coconut milk and part cows' milk. Both groups, comprising some seventy children, made almost exactly the same gains, averaging about 28 per cent over the

Pressing the emulsion from the shelled coconuts. The galvanized iron bands confine the particles of coconut and prevent them escaping into the room. H. S. Walker, the inventor of the process, stands at the right



Sterilizing the equipment with sodium hypochlorite solution. In the tropics, great care must be taken to prevent bacterial contamination of plant and product. Insects abound and can become as great a pest as elsewhere



control group which received no milk of either kind.

The coconuts used by the Tropic Products Co., the company formed to manufacture and sell the vegetable milk, are delivered with the outer husk on. These are removed only as needed, insuring a better and more uniform flavor in the products made. The husk is removed by striking the nut against a heavy iron spike or stake driven into the ground. It is done with a twisting motion that tears off the fiber almost without further effort on the part of the workman, though the uninitiated will have no such success! On large plantations, where many nuts are husked daily for drying as copra, one man can husk from 1,000 to 2,000 nuts a day.

The shell is cracked by tapping it with a sharp, hatchet-like spike. It is then pried off much as an egg is peeled, and the brown skin on the shell or convex side of the meat is shaved off, if the nut is to be used for making "milk" or light colored paste. This is done with a modified shoe knife. The meat is then ready to begin its transformation into milk, syrup, or paste.

Before going into the shredder the pieces of nut meat are given a bath in alkaline hypochlorite solution. This is necessary if growth of organisms is to be prevented, attacks of insects kept down, and their presence in the plant avoided.

The meats are shredded in a machine much like those used in making shredded coconut; that is, a cylinder with a revolving horizontal plate at the bottom. In the plate are set a series of knives at an angle so that, as the nut meats are pressed down against the plate, the knives shave off shreds or slices.

After shredding, the meat is placed in the curb of a hydraulic press and a natural emulsion pressed out of it under about 3,000 lb. pressure. Once the primary emulsion has been obtained, subsequent treatment is carried out in dairy equipment. The emulsion is diluted to milk-like consistency with the coconut water that was removed at the time when the nuts were opened and the mixture treated just as milk in a dairy would be. It is pasteurized at 150 deg. F. for 30 min., run through a homogenizer, over a Baudelot cooler, and finally bottled under refrigeration. It is distributed under the name of "Cocolait" over "milk" routes.

The next product developed by the Tropic Products Co. was the native syrup on which the work was originally started. The base of this product is the same emulsion that is used for the manufacture of Cocolait. After running from the presses it is mixed with invert sugar and cooked in steam-jacketed copper kettles. From the kettles it is run into containers, either one- or five-gallon tins if the syrup is to be used for the soda fountain or by manufacturing plants. Some is also packed in glass jars with screw-on caps. These are attractively labeled, wrapped in cellophane with a booklet of recipes inclosed, and the whole packed in a bamboo tube after the same fashion that was used by the natives with the original *Matamis-sa-bao.*

This product is marketed under the name of Mandalay coconut syrup. It has the color of strained honey, a consistency slightly more viscous, and is slightly cloudy from the emulsified fat. It may be used as a table syrup or as honey would be and makes an excellent soda-fountain syrup.

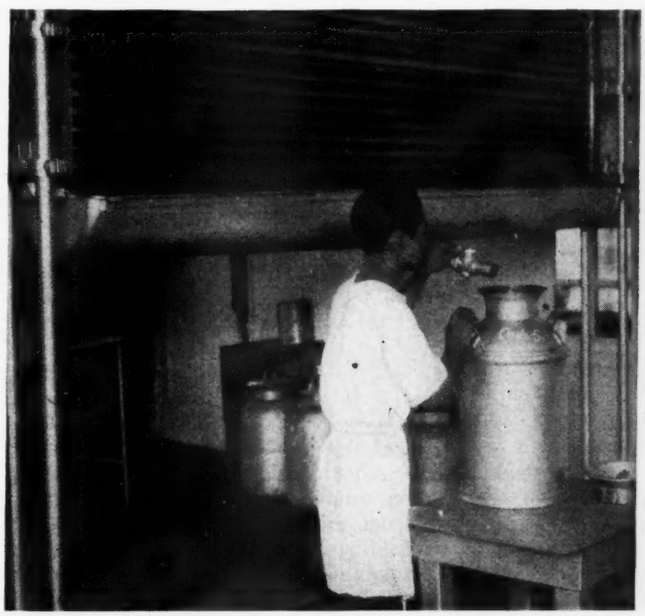
A light, honey-colored paste is made of a combination of the syrup and freshly shredded coconut meat. It has all the flavor of the fresh nut and looks much like crushed pineapple. It is also used for soda-fountain syrups and ice-cream toppings and can be used to advantage to form a novel mousse, when mixed with whipped cream and frozen.

Two additional products made from the shredded meat differ greatly from the light paste; one very heavy, which can be used for candy centers without additional cooking; the other a dark caramelized product for cake fillings and ice creams. For these products the brown skin of the coconut is not removed, as its presence gives additional flavor, added richness, and more color. It is this portion of the nut which is said to contain the "hard oil" used by confectioners in chocolate work. The heavy paste has more flavor than white paste made from desiccated coconut, and is more tender. The process involved in cooking is much the same as that of the syrup and light-colored paste.

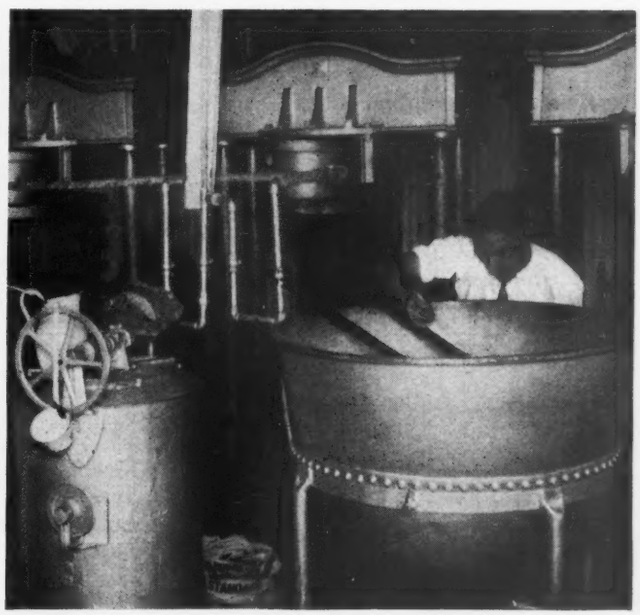
The dark, or caramelized, paste is the first coconut product manufactured that can be made into ice cream successfully. The particles of shredded meat are so saturated with sugars (invert) that they do not freeze completely when the ice cream is frozen and hence remain tender and delicately flavored. Even after storing at — 15 deg. F. for one month, a batch of coconut caramel ice cream was just as delicately flavored as when first made and the particles of coconut were as tender as the walnuts that had also been added to the mix. Bakers and pie manufacturers have found this paste useful in preparing coconut-flavored fillings and icings. A particularly delicious bread also has been made from the dark paste and dark whole wheat flour.

The residue left from the milk and syrup process is dried and sold to coconut oil manufacturers. This press cake still contains a large proportion of oil; from 58 to 62 per cent on a dry basis. The husks and shells are used as fuel, although the excess husks can be sold for coir fiber and the shells make excellent charcoal.

Baudelot cooler used to cool the coconut "milk"



Equipment used in making syrup and paste



Waste Product Recovery Gives Oatmeal Profits

By R. SUNDERMAN
Pittsburgh, Pa.

From Ewing Galloway, N. Y.

An enthusiastic consumer of oatmeal

IN the face of competitive market conditions it is rather obvious that waste-product recovery may play an important part in the success of a manufacturing business. Oatmeal manufacture illustrates this in that the advantage of starting out with a well-planned and economical mill* must be maintained both in the sale of the finished product and in the disposition of secondary products, if the enterprise is to succeed. In fact, the profit on the finished product, oatmeal, depends largely on how well the often neglected waste products are utilized.

When one considers that to produce 100 bbl. of oatmeal per day a mill requires 28,000 lb. of oats and will have as byproducts 200 lb. middlings, 1,500 lb. bran, and 9,000 lb. hulls, which with oats at 32c. per bushel cost the mill $107 daily, the importance of waste products becomes more apparent.

When marketed in the usual manner these products have a total return value of $13.05:

200 lb. middlings@$18.00 per ton	$1.80
1,500 lb. bran@$3.00 per ton	2.25
9,000 lb. hulls@$2.00 per ton	9.00

This shrinkage of $93.95 is a heavy burden to throw upon the 100 bbl. of oatmeal, which on weight basis represents only $180 of the $287 that the mill pays for the oats. Reduction in the percentage of bran or hulls produced is impracticable and the possible decrease of 50 lb. in middlings produced does not mean much. If the shrinkage due to waste products is to be reduced materially it becomes evident that the mill has to find some way to get a better return on these waste products, which represent more than 37 per cent of the original purchase.

*FOOD INDUSTRIES, Vol. 3, No. 9 (September, 1931), page 372.

This article illustrates admirably how the fascinating work of studying waste products can result in profitable products from a traditional factory waste. Attempts to recover byproducts sometimes end disastrously from an industrial standpoint, but usually the reward is sufficient to make the effort worth while.

Among other examples that might be cited as giving profitable results are the following.

By the intelligent use of decolorizing agents one of the largest spice grinders in the country converted his rapidly accumulating stock of mustard oil from a product that had no market at 6c. per gal. to a product that had a demand market at 50c. per gal.

By experimenting with spent malt liquor which was going into the sewer in large quantity daily, a cereal manufacturer learned how to convert this liquor into malt vinegar at a very small cost. In this case a byproduct that had been a total loss became the base of a product that netted an annual profit of $15,000, equal to one week's payroll, or 2 per cent of the yearly labor cost of the entire plant.

Middlings consist mostly of the broken ends of groats, flour, and possibly some fine hulls, which means that they are really oatmeal in coarse powder form mixed with a small percentage of hulls which are the results of imperfections in the milling process. As middlings they usually are sold alone or mixed as cattle or chicken feed for what middlings, as such, will bring in the market. They have more feed value than flour middlings and for this reason might command a little higher price, but why should good clean oatmeal sell for feed at feed prices when with a little effort is can be converted into oatmeal flour and sell for as much as $50 per ton instead of $18?

This has been done by installing in the line a small buhr mill with a bolting reel to handle the flour as made. Cracker and special food manufacturers are glad to get their oatmeal in flour form and represent a ready market for this flour at $50 per ton. Such a slight change in the customary method of oatmeal milling raises the market value of 200 lb. of middlings from $1.80 to $5, adding $3.20 income per day to the mill for each 100 bbl. of oatmeal produced.

The 1,500 lb. of bran is often run in with the hulls and will bring only the hull price of $2 to $3 per ton. If separated and sold as bran it may bring $3 per ton when a buyer can be found for it as bran. Its 15 per cent protein and 4 per cent fat content gives it a high feed value, but its light, dry, and dusty character makes it undesirable for cattle feed. It weighs about 8 to 9 lb. per bushel.

After considerable experimental feeding it has been found that the best results from this product can be obtained by feeding it to hogs. Its mineral salt and vitamin content in addition to the protein and fat cause growing hogs, when

fed with it in slop form, to show such rapid growth and such strong, healthy frame development that they are ready for market earlier than are those not fed the bran. The problem is to get hog raisers to recognize the value of the product and to buy it.

Since a mill in Iowa bought considerable corn and oats from the local farmers, who were also the hog growers, a bag of this bran was thrown on the wagon when a load of grain was delivered, with the request that it be fed according to the directions given in the circular in the bag. At the initial price of $5 per ton the hog growers came to realize the value of the bran as hog feed and the demand became such that the selling price was gradually advanced to $15 per ton. The demand continued to grow until not only was the daily output of the mill absorbed but an accumulation of 100 tons was depleted. Also for a year after the burning of the mill inquiries were received asking where such a product could be obtained. It was not common practice at that time to separate and sell bran as basic feed.

More Money From Bran

Raising the market value of this bran from $3 per ton to $15 gives an additional profit of $9 per day per 100 bbl. of oatmeal, making a total of $12.20 per day value added to the middlings and the bran.

Profitable disposal of the 9,000 lb. of hulls daily is not so easy. Oat hulls have practically no feed value in themselves, consequently they cannot be disposed of at advanced prices under another name, as is done with other waste commodities. They are often used for packing fragile products, for which purpose they have value, but this use does not add to their market value. They may be ground and sold at slightly higher price, but the grinding cost practically absorbs the difference in price. They can be used as fuel under the boiler but their fuel value is only about $2 to $2.50 per ton, with the disadvantage that not enough are produced to keep the steam plant supplied continually. Also, because their fuel value is no greater than the prevailing market value when sold as hulls, little is gained by using hulls for fuel even when there is an accumulation.

In this connection, one exception might be cited which netted the mill about $4 per ton for the brief period of three days at a time when hulls had a market value of only $2 per ton as hulls. At this time there was a coal strike in the Central Western field and the price of coal quickly advanced to twice its normal market value. The mill was located in Iowa and had been getting its coal on a verbal agreement at about $2.50 per ton, but when the strike started the mine owners began to take advantage of the situation and to ship their coal to the strike affected cities at double the normal price the mill had been paying and tried to compel the mill to pay the advanced price. Negotiations to uphold the validity of the verbal agreement between the mill and mine owner were futile. The mill informed the coal producer that unless coal was delivered at the old price by noon it would burn oat hulls and the coal business would be lost to him.

The warning was ignored. Necessary installations were made to lead the hulls from the bin to the boiler house. Fortunately, at the time the mill had such an accumulation of hulls that when the mine owner passed the mill on successive mornings, he saw hulls being fed to the firebox. On the third day he voluntarily agreed to supply coal at the old price if the burning of oat hulls would be discontinued. During those three days the mill had profited by several hundred dollars and, unknown to the mine owner, had almost exhausted its accumulated supply of hulls.

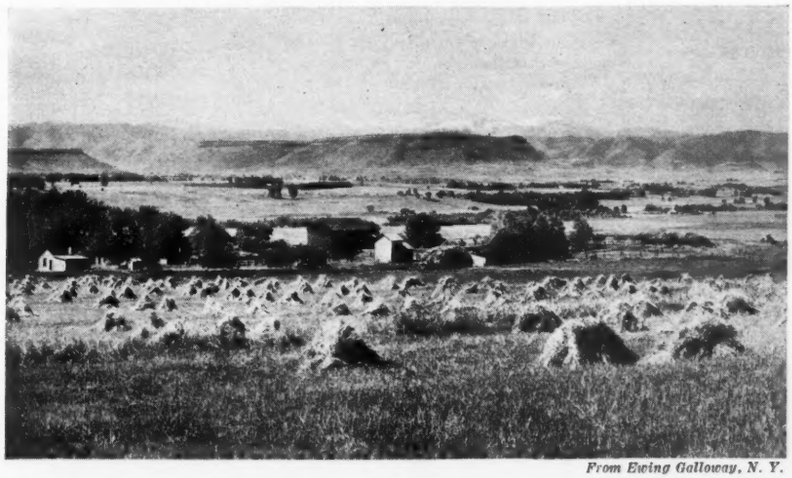
Such opportunities for profitable utilization of waste products are too rare to be counted on. Oat hulls are commonly used in mixed feeds to supply the necessary roughage to the concentrates. Regardless of whether whole or ground shells are used, feed manufacturers will pay only the current market price.

Marketing Hulls

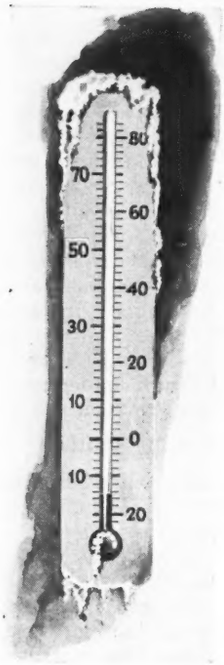
After exhausting all other means to find a better market for hulls, recourse was had to the organization of a feed department to produce a high-quality feed, for which there is always a demand, and to utilize the hulls on a price basis of a dollar per ton more than they would bring on the open market. This advance of a dollar per ton for the hulls added only about 20 to 25c. per ton to the cost of the feed. The quality of the feed justified the price and the demand gave the desired outlet for the 9,000 lb. of hulls at the advanced price of a dollar per ton to yield the mill an increased return of $4.50 per day on the hulls, not to mention the profit made on the feed itself.

Thus the market values of the waste products were increased for a total of $16.70 per 100 bbl., representing a profit of nearly 16¾c. per barrel of oatmeal produced. In checking up on the manufacturing cost of the mill it was found that this intelligent handling of secondary products had practically absorbed the payroll and manufacturing overhead of the mill.

A Colorado Valley oat farm

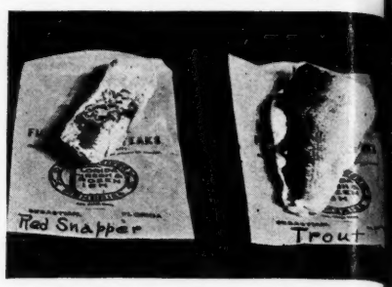


From Ewing Galloway, N. Y.



"Fifteen Below" In Florida

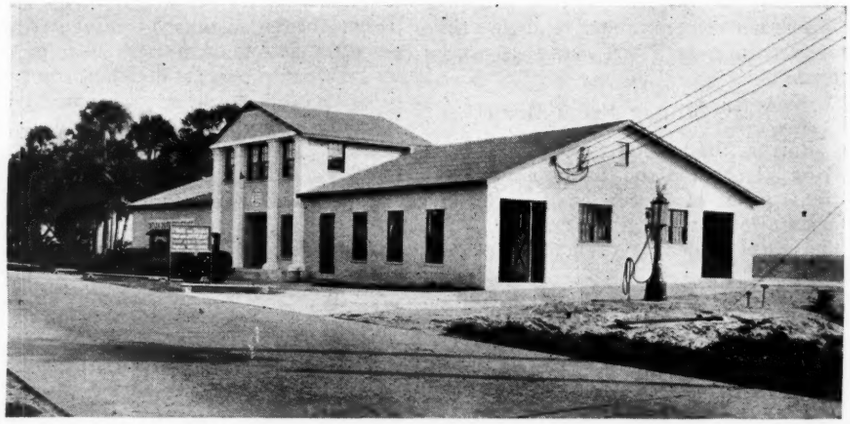
—and not even a real estate salesman shivers at the thought. In fact, as applied to fish at the freezing plant of Indian River Fisheries, this climatic heresy has proved a marked success



Both fillets and whole (cleaned) fish are frozen at the plant, also frogs legs, crab meat, and the like. When frozen, they are glazed, sealed in glassine envelopes, packed in double thick

IF YOU were one of the lucky ones who sped along Florida's Dixie Highway last winter, your thoughts on freezing probably were centered on the plight of the folks back home in the North. But just north of Sebastian, about 40 miles north of Fort Pierce, your attention may have been caught by the plant of Indian River Fisheries. Though the building looks more like a residence or tavern than it does like a factory, it houses a neat, small-sized quick-freezing unit designed and installed by the G. W. Mathews Co., which is unique in several respects.

The fact that tourists in Florida often carry away a fond memory of the fish of that region—pompano, Spanish mackerel, red snappers, and the like—is responsible for the enterprise. The chief aim of the corporation has been to capitalize upon those gastronomical memories by shipping the fish in a frozen state to devotees in all parts of the United States. "Ship a box home," reads the sign in front of the plant, just a few feet from the Dixie Highway.



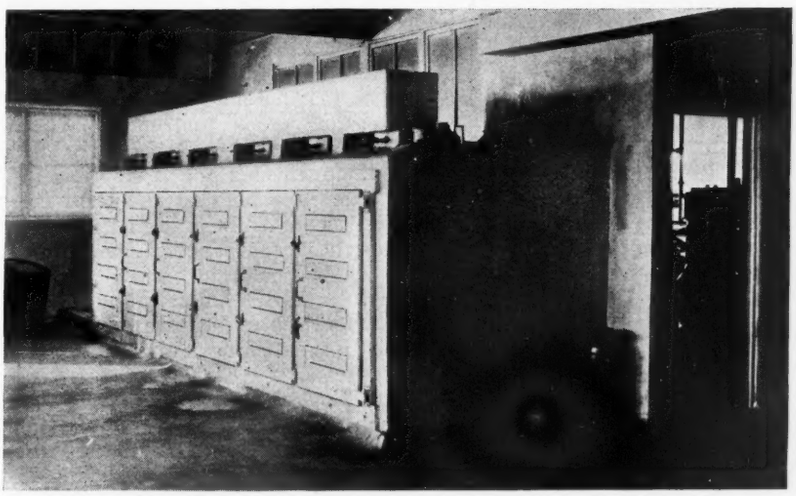
Located on the Indian River directly opposite the Sebastian Inlet to the Atlantic Ocean, the plant is easily accessible to its raw material supply. Attractive appearance stops visitors, provides good advertising. The building, 88x45 ft., has a stucco exterior on interlocking tile. Space is provided to double plant capacity when business warrants. In the left wing, storage rooms at 10 deg. F. have a capacity of 200,000 lb. of frozen fish

At the end of an 800-ft. pier is located a building in which cleaning, scaling and filleting operations are conducted. This removes from the plant proper those operations that ordinarily make the fish plant more or less unappetizing to visitors. Fish brought from the pier to the plant are first put through a sterilizing bath, then handled only with sterilized rubber gloves

cartons of 200 lb. test corrugated board. Fillets of trout, Spanish mackerel, sea bass, sergeant, mullet; steaks of grouper, red snapper; whole pompanos, are popular products

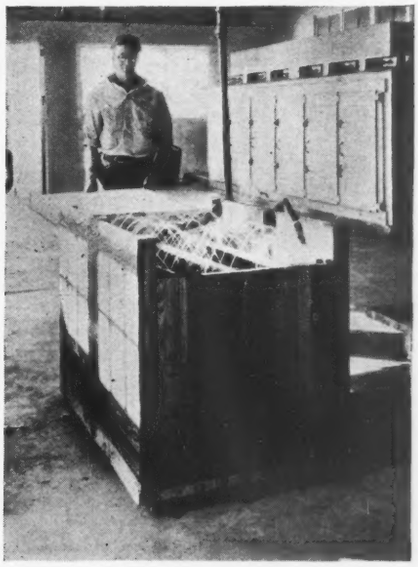
Right—The product to be frozen is placed on the upper side of an inverted galvanized-iron pan. Another pan slips tightly over the top, excluding brine, providing double metallic contact. Cross-fins on the indented side of the lower pan give increased heat conduction surface, also add to mechanical strength

Pans containing the product are placed on shelves between perforated pipes in the insulated freezing chambers. Calcium chloride brine at from —10 to —20 deg. F. (usually at —15) is sprayed downward on the top and upward on the bottom of the pans, and then flows down to a tank beneath the freezer. Freezing time is 15 to 30 minutes, depending on the product



The battery of six freezing chambers, designed and built by the G. W. Mathews Co., Orlando, Fla. Each has a capacity of about 150 lb. of product. The brine flow to each chamber is separately controlled, aiding continuity of operation. Capacity of the plant is about 1,000 lb. per hour. Four men can operate it. Through the doorway is a glimpse of the refrigeration machinery, a 7½x7½-in. Baker compressor, driven by a 40-hp. motor; also a 650-g.p.m. brine pump to operate the spray system

A water spray on the pan bottoms as they come from the freezing chambers loosens the product. Glazing and packaging complete the operations



What Europe's Bakers Ask of Flour

Traditions of taste that are centuries old; labor laws, import restrictions, bakery equipment, and the general economic situation—all play a part when the European baker chooses flour for his bread. Sent to Europe by the Department of Agriculture to study the wheat export problem, Prof. Swanson tells what national baking practices require of flour

By C. O. SWANSON
Head of the Department of Milling Industry
Kansas State Agricultural College

THE main use for imported flour in Europe is in bread baking. In most places, bread is baked with only flour, water, salt and yeast. Omission of sugar demands that the flour shall have the characteristic known as a good gasser, and for this reason an imported flour usually is not satisfactory when used by itself. Proper gassing power is obtained by blending with European milled flour. The omission of fat makes the bread tough, according to United States standards, but European people have acquired a taste for this class of bread.

Imported flour is desired mostly for its characteristic of strength. Flour made from European wheat (not Russian) is not satisfactory for bread baking when used by itself. The bakers say they want to use in the formula from 20 to 50 per cent of flour made from hard imported wheat. The strength of this flour is measured by the proportion needed to give the required characteristics for bread dough.

There are all kinds of bakers and bakeries. Large bakeries, directed by men who have made baking a special study, endeavor to make salable bread from the most economical flours. The smaller bakers consider their work more of an art; their main endeavor is to make a product which will appeal to the taste of their customers. Competition is very keen and the margin of profit very small.

Although the European baker is considered by some to be unprogressive, he does adapt himself to changing economic conditions. If he cannot use the flours which he likes best, because of the price, he will change his methods to suit the flours which economic conditions compel him to use. Flour is a greater item in the cost of European bread than it is in America.

Practically all dough mixers have a slow, gentle motion and are made to imitate the working of the dough by hand. This is thought to give it good aeration. Most of the ovens are of the peel type, but traveling ovens also are used. Bread wrapping is not the rule. It is said that Europeans object to having their bread wrapped because they desire to see the loaf before buying. However, bread-wrapping machines of European make are now making their appearance, and slicing machines are also coming into use.

England—It is sometimes asserted that in England millers are in such a strong position relative to bakers that they can dictate to the latter the quality of flour which shall be used. This does not seem to be the exact situation. The millers may exert an influence over what flours the bakers shall use, but they cannot dictate, because of the flour importers. If the English millers do not furnish what the bakers want, bakers go to the flour importers. The quantity of flour imported into England has been somewhat over 10 per cent of the total requirement, yet this has had a very important bearing upon the quality of the English milled flour. The American miller is thus in a position to influence the flour standards in England.

The main quality requirement is uniformity. Some bakers will find fault with the flour if it is actually better than they have been using, simply because it is different. It is for this reason that the mills lay such emphasis on making proper and uniform blends. The British baker cares very little about protein and not at all about ash. He cares a great deal about the color of the flour; dress or bloom, which to him indicates soundness. The principal quality he looks for is the way the dough handles in the baking process. It is for this reason that most of the mills make baking tests on a fairly large scale.

In England, both the sponge and dough, as well as the straight dough methods, are used. Total fermentation time for each is about 4½ hours, and the proofing time 40 minutes. Great emphasis is placed upon so preparing the dough that the proof shall give the bread good volume and texture. The tendency is toward methods which will enable the bakers to use a less strong flour, since this is as a rule cheaper.

The larger bakeries use one kind of flour for each of the different products, and the mills try to make flours which will suit. The smaller baker is more in need of a one-purpose flour. Because the English mills are on the ground and

No dieting fad appears to worry this girl as she slices a loaf of Hungarian bread in the market at Mezökövesd

By Burton Holmes from Ewing Galloway

study these needs of their own bakers they are in a position to offer stiff competition with American flour.

In general it seems that the English bakers need a medium strong flour, such as is made by the English millers. The nearest approach to this requirement would be hard winter wheat flour. Some bakers said that they would like to have some spring wheat flour for blending from Canada or the United States if the prices were not too high.

Ireland — There are four general types of baking in Ireland: straight dough; sponge and dough; soda bread; and small bakes. The last named includes all kinds of pastries, cakes, cookies, crackers, and require the softer flours. One of the largest bakers in the country used for his straight dough 50 per cent English milled flour, 25 per cent Canadian, and 25 per cent Irish milled flour. Another large baker said that he used mainly all English milled flour for the straight dough, but mostly Canadian flour for the sponge. He used a rather long-time sponge. The bakers said that the tendency is away from the sponge method to the straight dough, which makes possible the use of a weaker flour which costs less. The Irish bakers declare that their trade on the whole requires a stronger flour than the English trade.

For the soda bread, soft wheat flour made from White Pacific, Australian, and some European wheat is used. This bread is baked with soda and buttermilk, or with soda and phosphate. Much of this baking is done in the country homes, but considerable quantities are made also in large bakeries.

Scotland — In Scotland there are three main methods of bread making: the quarter sponge, the half sponge, and the straight dough. The quarter sponge is confined mostly to the West coast and the half sponge is the general practice of the East, the North and the Borders. The straight dough method, however, is now making its appearance throughout the country. For making the sponge, a strong Canadian flour is used, and for doughing, a blended flour, similar to the English milled. For the straight dough a blended flour is used. Formerly "barm" bread, requiring a long fermentation and a strong flour, was popular, but at the present time very little of this bread is baked. Much of the bread is baked on the drawplate. The loaves are placed close together so as to produce no side crust except on the border loaves.

In the past, Scotland has required a very much stronger flour than England or Ireland. Economy is now modifying this demand to some extent.

Holland—Holland mills about 75 per cent of the flour consumed in the country, most of the imported wheat coming from United States, Argentina and Canada. Smaller quantities come from Roumania, Germany, and Russia. Although Holland produces about 100,000 tons of wheat annually, it is of very little importance in milling. Large quantities of native wheat are used in making wheat meal, and the rest as feed for animals.

The Holland bakers, as a rule, use a weaker flour than the English bakers, because of legislation which regulates both the time at which bread shall be baked and the quantity of ingredients. Night baking is prohibited and hence all bakers must use a short fermentation. Canadian flour is too strong, but hard winter wheat flour is very satisfactory for blending. All large bakers are prepared to blend their flours. About half the bakers may be classed as large and half as small.

Ewing Galloway, N. Y.

A French peasant girl returns from the baker's. Though it might drive a slicing machine designer crazy, the shape makes the loaf easier to carry

The stringent bakery legislation favors the small baker, and he also has the advantage of lower delivery costs, which are greater than the manufacturing costs for the large baker. The very small baker must not begin to mix his dough before 6 a.m. A larger shop may begin at 5 a.m. and the largest shop at 3 a.m., but the scaling of the dough must not begin until 5 a.m. In no case may the large baker deliver his bread to the retail shop before 9 a.m. and no fresh bread may be sold before 10 a.m. This means that the large baker has one hour in which to deliver his bread, and this limits to a great degree the operations of the large bakers. This legislation was enacted to save the small baker from extinction, threatened by the development of better means of delivery, because of good roads and efficient trucks.

Two main classes of wheat bread are baked in Holland: water bread and milk bread. There is no inducement for the Holland baker to use more water in the formula than necessary to make good bread, as the law regulates the quantity of dry matter which shall be present in the loaf. The unit weights of loaves are 400, 800, and 1,200 grams, and these must contain 240, 480, and 720 grams of dry matter, respectively. Whether the loaf actually weighs more or less does not matter. For this reason a flour with strong water-absorbing properties has no special value. Obviously, the quantity of dry matter in a flour is of great importance, as it determines the quantity of bread that can be made from a given weight of flour.

This bakery legislation favors the flour from hard winter wheat above the flour from strong spring wheat. The strongest competitor of hard winter wheat flour is the Holland milled flour. The hard winter wheat flour is favored because, as a rule, it contains less moisture than the inland flour and hence will make more kilos of bread.

Whole milk must be used for milk bread. To this may be added 10 per cent hot water so as to bring the milk to the required dough temperature. The law specifies the quantity of fat which shall be present in milk bread, corresponding to the quantity of whole milk used in mixing the dough.

Belgium—The only legal restrictions on the bakeries in Belgium are the 8-hour law, which applies in all industries, and one requiring that the 2-kg. loaf shall have this required weight after 24 hours. For this reason the baker will take into account the water-absorbing capacity of the flour, in estimating its value. As the imported flour amounts to only 5 per cent, and as the millers buy most of this to blend with their own flours, it means that the Belgian baker is restricted to the home-milled product.

In the one bakery visited only flour, water, salt and yeast were used in mixing the dough. The sponge and dough method was used, but only 4½ hours was consumed in the whole bread-making process. The bread was baked on the drawplate in such a way that no side crusts were produced except on the border loaves. The quality of flour required in this bakery seemed to be quite similar to that used in England, though perhaps somewhat weaker.

Switzerland—The bakeries of Switzerland probably are furnished with a higher quality of flour than any other bakeries in Europe, but for all that, they cannot claim that they make a correspondingly higher quality bread. Most bakers use the long-time slack sponge method. Some use yeast, and some use "sauerteig." This gives the

bread a sour taste which is liked by many people. The bakers are very critical of the flour. If anything goes wrong, the flour is to blame. They want a flour that will make good bread under a wide range of conditions. Only water, salt, yeast and flour are used in bread baking. The bread is baked so as to have a very hard crust, and the loaves are pear shaped, which gives them a large amount of crust. The crumb is very much like the crumb of English bread.

Denmark—Denmark also has a law which prohibits night work in bakeries. Because of this, two baking procedures have been developed. One aims to make the time of fermentation and proofing as short as possible and the other makes it longer than normal. For the short process the bakers use the same scheme for starting the doughs as is used in Germany. Danish bakers, however, have the advantage of having a strong flour, which stands these forced methods. In the long process, the dough is mixed the evening before, but only one-fifth as much yeast is used, and the dough is allowed to ferment during the night at a low temperature. In Denmark, most of the wheat bread is made with skim milk instead of water.

Germany—Night baking is prohibited in Germany. In a large bakery the following procedures were observed: The flour and other ingredients except the water are placed in the mixing machine the evening before. At 3 a.m., an electric connection with the clock starts the dough mixer and a mechanism which lets in the water. The mixing continues for 10 minutes, then the dough ferments for 45 minutes, after which the machine works the dough for 3 minutes. It now ferments until 5 a.m., when the workers come to scale the dough, and start the rounders and molders. The proofing time was said to be 25 to 30 minutes. Thus the total time for making bread is only a little over three hours.

Very little pan bread is baked. Most of the loaves are of the long, rounded type, baked on a flat surface. The proofed loaves are cut or slit on top in various ways before going into the ovens, a treatment thought to develop more flavor.

The large bakeries have elaborate equipment for blending flour. The different kinds of flour are drawn from the containers in such percentages as desired by means of regulating devices. Some bakeries have very efficient machinery for moving the doughs.

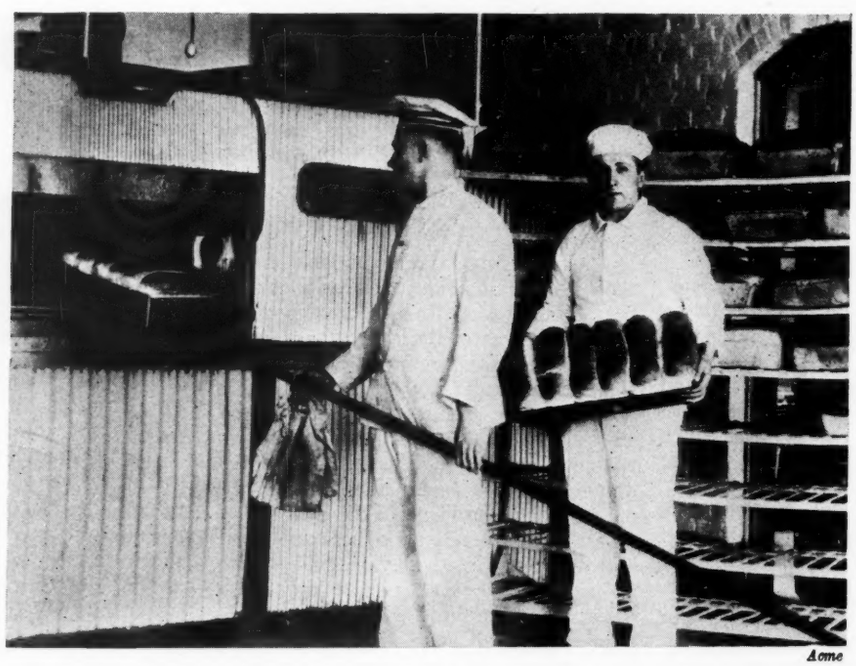
Sweden—Since night work is forbidden by law in Sweden, it is necessary to use quick methods for baking bread. The men who mix the dough come at 4 a.m., and the rest of the workers at 6 a.m. As bread should be baked by 7 a.m., it means that quick methods are necessary. These depend on the use of large quantities of yeast and on proofing the dough in a hot moist room whose temperature is 104 deg. F. Such methods require considerable strength in the flour.

Long-time methods also are in use. The one most favored requires chilling of the dough. The dough is mixed in the usual way the afternoon before, and then put into a room whose temperature is 46 deg. F. This practically suspends fermentation. The next day the dough is taken out whenever wanted, warmed, and the baking process finished. This method has the advantage that fresh bread may be baked all through the day. The work is better distributed, since the preliminary processes take place the afternoon before.

Norway—Norway also has a law which prohibits night work in bakeries. For this reason the bakers have automatic devices for starting the mixing, as in other countries. Chilling of dough is not practiced, as in Sweden. The sponge method is not used for wheat bread, but rapid fermentation is brought about by using large quantities of yeast, fermenting at 30 deg. C. (86 deg. F.) and proofing at 35 deg. C. (95 deg. F.) with high humidity. Both pan and no pan bread is baked. The baking conditions require a strong flour; that is, one which will make satisfactory bread with these forced methods. The time from start to finish of the baking is often not more than 2½ hours. In a large bakery visited the mixers were the one-arm type so common in Europe. Lifting devices were available for handling the dough at the various stages. The proofing was done in a cabinet with traveling shelves in which high humidity was maintained by introducing steam.

Conditions in Norway are more auspicious for the continuation of flour importations than in any other of the countries mentioned. The state monopoly thinks that the importation of a certain proportion of the flour is to the distinct advantage of the country.

Except for a few large bakeries, most European bread is baked in peel-type ovens

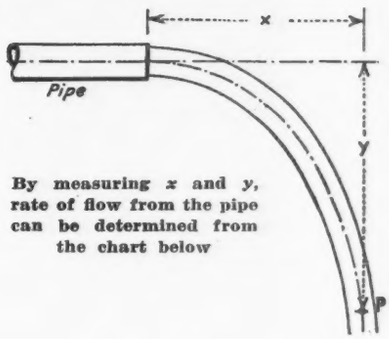


Acme

A Quick Way to Figure

The Flow From Pipes

By D. S. DAVIS
Appleton, Wis.



By measuring x and y, rate of flow from the pipe can be determined from the chart below

MANY occasions arise in food manufacture when it is desirable to know the velocity or quantity of liquid flowing through a pipe. When more accurate methods are impossible or unnecessary, a rapid approximation can be calculated from the coordinates of a stream as it emerges from a horizontal section.

In the case of small streams of water, actual and calculated values agree within 4 or 5 per cent, although coefficients of discharge and contraction are neglected. Even with more viscous fluids, such as syrups, it is estimated that the results are accurate to well within 10 per cent.

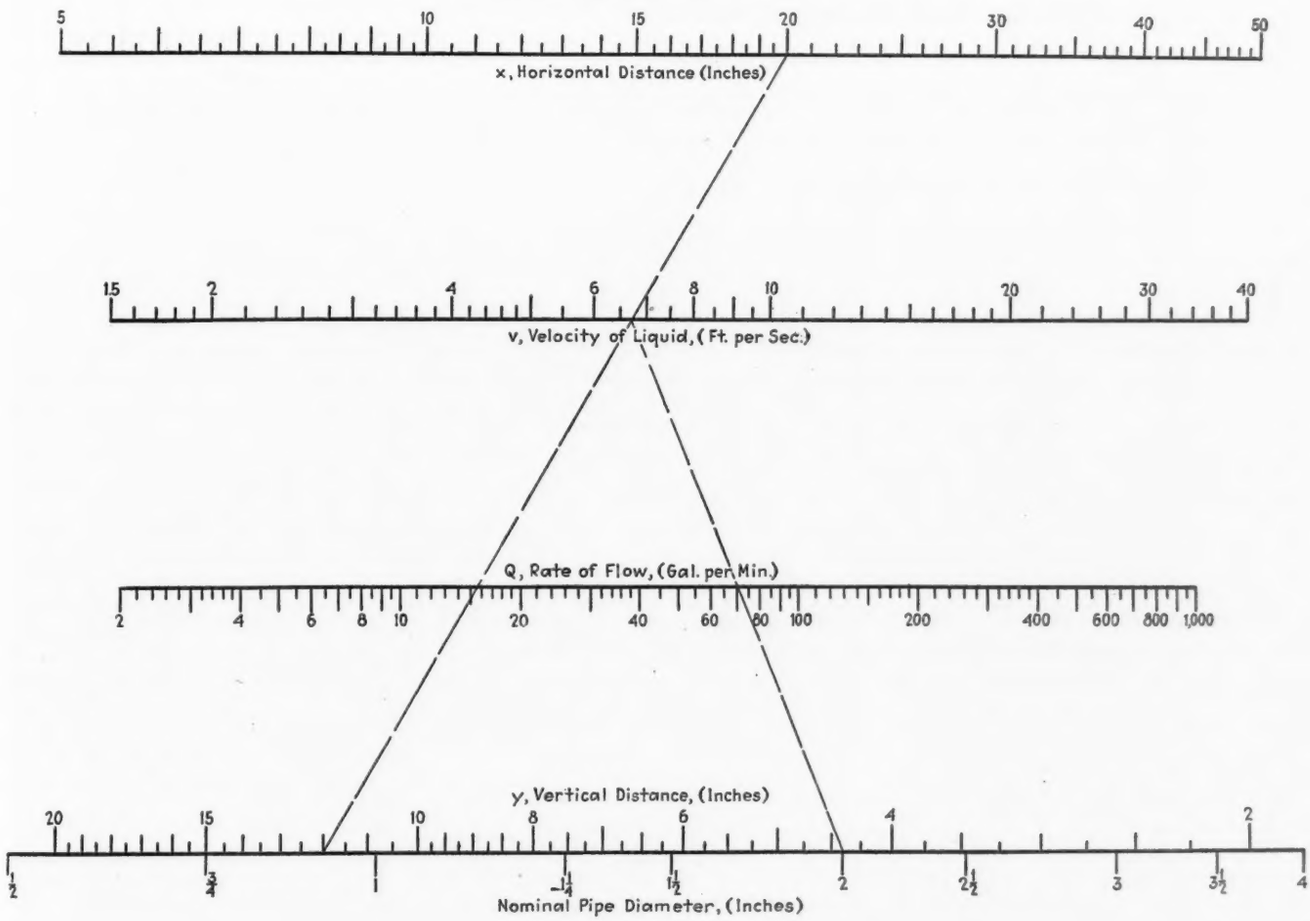
As shown in the upper figure, the coordinates x and y are measured at any convenient point, P, in the center of the stream. As pointed out by Hewitt (*Rock Products*, Vol. 32, No. 12, p. 64) the equations involved are as follows:

$$v = \frac{1.158\,x}{\sqrt{y}}, \text{ and } Q = \frac{3.61\,A\,x}{\sqrt{y}}$$

where v = the linear velocity of the liquid leaving the pipe, in feet per second; Q = the rate of flow, in gallons per minute; A = the internal cross-sectional area of the pipe, in square inches; and x and y are in inches. These equations are solved in the nomograph below, making it a simple matter, by means of a straight-edge, to read velocity or rate of flow directly from the chart. A has been replaced by a scale reading in nominal pipe diameter in inches to simplify the problem.

Use of the chart is illustrated as follows: Suppose, for instance, we wish to find the linear velocity and rate of flow from a 2-in. pipe, when x has been found to equal 20 in. and y to equal 12 in. Following the key, connect 20 on the x scale with 12 on the y scale. Then read the velocity where the line crosses the v scale, 6.7 ft. per sec. Now connect the latter point (on the v scale) with the pipe-diameter scale at the bottom of the page, and read on the Q (rate-of-flow) scale, 70 gal. per minute.

Key:—A straight-edge from x to y gives velocity on the v scale; from v to the diameter scale gives rate of flow on Q


5 10 15 20 30 40 50
x, Horizontal Distance (Inches)
15 2 4 6 8 10 20 30 40
v, Velocity of Liquid, (Ft. per Sec.)
Q, Rate of Flow, (Gal. per Min.)
2 4 6 8 10 20 40 60 80 100 200 400 600 800 1,000
y, Vertical Distance, (Inches)
20 15 10 8 6 4 2
½ ¾ 1 1¼ 1½ 2 2½ 3 3½ 4
Nominal Pipe Diameter, (Inches)

Field of Jerusalem artichokes under cultivation by the department of horticulture, Iowa State College

Sugar From Artichokes

Levulose—a sweeter cousin of sucrose, the well-known cane sugar—obtained from the tubers of artichokes, dahlias and similar plants, has long been known but never before produced at a cost that permitted commercial exploitation

By JAMES H. McGLUMPHY
and
JACK W. EICHINGER, JR.
Department of Chemistry
Iowa State College,
Ames, Iowa

THE interesting observation is made by C. D. Ingersoll, in the July, 1931, number of FOOD INDUSTRIES, that levulose "now appears at a resting stage in the public mind" and that very possibly another 40 to 50 years may be necessary for this sugar to become available industrially.

Following several years of laboratory experimentation a semi-commercial plant, capable of producing 50 lb. of levulose per day, has been constructed and operated at Iowa State College during the past year. The remarkable success of these small-scale operations leads the writers to believe that the "public mind" should now be prepared for an earlier realization of this important addition to our available carbohydrates. The process used will produce levulose at a cost comparative to that of beet sugar if carried out on the same large scale of production.

There are only two methods for the preparation of levulose which have shown promise of succeeding commercially. Crookewitt (1843), the first to prepare levulose, isolated the starchlike substance inulin, and converted it to levulose by boiling in water. Inulin occurs in many tuberous plants such as the dahlia, chicory and Jerusalem artichoke. It can be extracted from these plants with hot water and will crystallize out of the solution upon cooling. The Crookewitt method, to be profitable, requires raw material which has a high inulin content as compared to the other levulose-yielding polysaccharides present. Chicory and dahlia tubers fulfill this requirement but are more difficult to propagate than the Jerusalem artichoke. The latter plant is a poor source of inulin but yields an abundance of "levulins" which are convertible to levulose.

The second method of importance was discovered by Dubrunfaut in 1847. By adding lime to a solution of invert sugar (obtained by the hydrolysis of sucrose) he was able to separate the levulose as an insoluble lime salt. After acidification a levulose syrup was obtained. This method can be applied to any levulose-yielding raw material.

These two methods for the preparation of levulose have been revived periodically and many attempts have been made to apply them commercially. Jungfleisch and Lefranc (1880) were the first to prepare crystalline levulose by the use of organic solvents. It is somewhat uncertain which of the many workers was first to crystallize levulose from water solution; however, Browne's Handbook of Sugar Analysis describes a method as early as 1912 in which this was accomplished. The Crookewitt method was tried on a factory scale in Europe in 1926, using chicory as the raw material, and both methods have been the object of studies at the U. S. Bureau of Standards during the past eight years.

Of the many plants which yield levulose, the Jerusalem artichoke (*Helianthus tuberosus*) has long been known to be the hardiest and most prolific. The

plant lends itself readily to mechanized agriculture. The yields reported for the different varieties range from 10 to 60 tons per acre. The levulose content varies from 7 to 24 per cent. The artichoke is said to produce more sugar per acre than any other plant except sugar cane, while the cost of production per acre is less than for any other sugar-yielding plant.

At Iowa State College, the Dubrunfaut method has been adopted for the separation of levulose from the Jerusalem artichoke. However, important modifications have been made which in the opinion of the writers make the process really commercially possible.

The artichokes are harvested about Nov. 1 and immediately washed, run through a mechanical slicer and dried under carefully regulated conditions to prevent the destruction of levulose. The dried chips are stored and are found to keep indefinitely, thus enabling the operation of the plant throughout the year. The chips are extracted with hot water in a diffusion battery using the familiar countercurrent principle. The extract obtained may be as high as 50 per cent total solids. Upon acidification to the proper pH the inulin and levulins are converted to levulose. The solution, after filtration, is ready for the precipitation of lime levulate.

The success of the Dubrunfaut method is almost entirely dependent upon the proper control of this precipitation. All previous workers have recommended that the precipitation be carried out at a low temperature (0 deg. C., or lower if possible). Also comparatively dilute levulose extracts have always been used. The lime levulate must be of such a nature that it can be filtered, washed completely and carbonated as quickly as possible to obtain the highest yield of sugar.

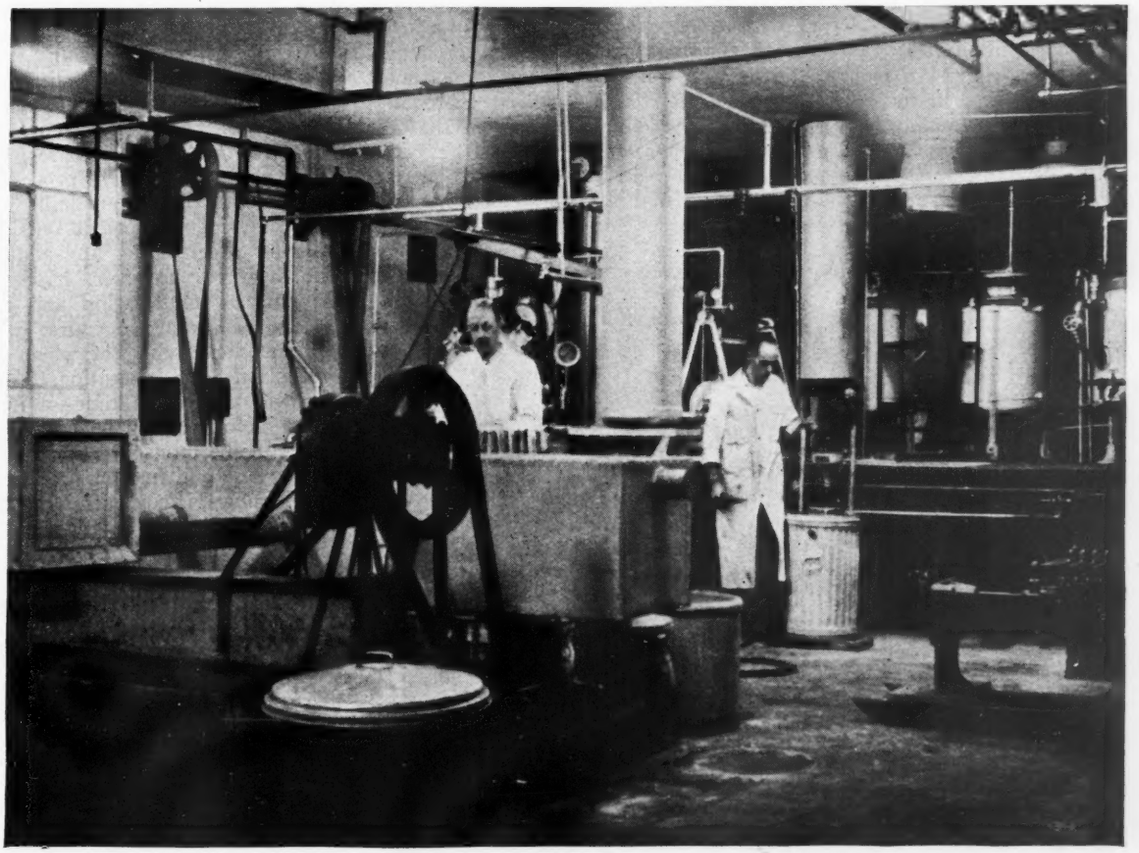
The writers have found that a very granular and easily filterable lime levulate precipitate can be produced at room temperature by the continuous introduction of the proper concentrations of the levulose-containing-solution and lime into a reaction chamber and the continuous removal of the product. The lime levulate is sufficiently granular so that it can be quickly filtered and washed on the various types of continuous filters. There is little or no loss of yield experienced by operating at the higher temperature. The very short time required for this continuous operation prevents any loss that might be caused by any prolonged contact of the levulose with alkali. The possible loss due to the increased solubility of lime levulate at the higher temperature is kept at a minimum by careful control of the concentration. The economic importance of this high-temperature operation is obvious.

The lime is liberated from the lime levulate by carbonation, the calcium carbonate filtered out and the filtrate evaporated in vacuo to a thick syrup. Crystallization is accomplished by the usual sugar-house methods. Since levulose is somewhat more soluble than sucrose, a greater length of time is required for crystal growth. The crystals are separated in a centrifuge. A second and third crop of crystals may be obtained by further evaporation of the molasses.

The final molasses is a rather high-grade, golden-colored syrup with a very pleasing sweet taste. It may be either used as a syrup or returned to the process at the lime precipitation stage.

Levulose possesses unique properties which will make its introduction into our list of available sugars invaluable. These properties have been widely discussed in the scientific and popular literature until an almost ready-made demand awaits the advent of levulose. Chief among its possible uses is to supply the desire for a sweet and the necessity of carbohydrate to the ever increasing number of those suffering from diabetes. The high solubility of levulose makes it valuable for cold drinks. It has been used for infant feeding, since it is one of the most easily digested of the sugars. It prevents the crystallization of other sugars in its presence, and therefore might be used to prevent this from occurring in jellies, in honey and in ice cream. The fact that it is the sweetest of all sugars should make it ideal for the confectionery industry, where alone or in combination with other sugars it should make any combination of sweetness, solubility and texture possible. The culinary artist awaits the coming of levulose to create new and undreamed-of delicacies.

Experimental levulose plant at Iowa State College with a capacity of 50 lb. per day



How the Chinese Mill Wheat

By WALTER BUCHLER
Shanghai, China

THE Chinese since time immemorial have milled grains by means of a stone mill driven by a buffalo or other animal, and used their hand or foot for sieving out the flour after grinding. These primitive methods are still in practice in many parts of China; where a man owning 30 or more bullocks and with 30 millstones for grinding wheat or rice is considered to have a large business. The flour produced in this way is about equal to the old English windmill or water-mill grist flour. The Chinese use this flour mostly for cakes and macaroni.

This primitive Chinese method of milling is necessarily a very slow process, but in China time is of little moment and the owner of the mill will as a rule work it himself with the assistance of a few boys who cart around the wheat. The flour is ground very fine, as the Chinese will grind, sieve, and repeat over and over again until the last remnant of flour is out of the wheat. Often the flour will pass through the stone five or six times.

Western methods of flour milling were introduced into China in 1896, when Henry Simon, Ltd., equipped the first modern flour mill in this part of the world with steel rollers in place of the ancient stone mills. In the course of time China's domestic and foreign trade developed and new industries were started in Shanghai, which is the center of her more important industries and is the largest city in China. Improvements witnessed in other parts of the world in flour milling were adopted in China, though the mills—there are now over 100—are not as up to date as in America or Europe. There is not as great demand for high-grade flour in China and more straight grade flour is milled, causing the method of milling to be somewhat different from that used in Western countries. The system in vogue is very much shorter, the same quantity of flour being produced in the Chinese mills with about half the machinery used in a modern American mill. Suppliers of flour-milling machinery who maintain representatives in Shanghai are now endeavoring to educate Chinese millers to introduce the longer system, not only in order to obtain a better flour but also to get an improved percentage of flour from their wheat. Chinese millers, however, are very slow to introduce new or more machinery, as the initial cost of a mill so equipped would be so much greater than that of a mill working on the present Chinese system.

As it is, of the 120 mills in China, less than 20 per cent are well equipped with good machinery. The majority are running machinery that is out of date, not well maintained, and almost worked to death. It is customary, among the Chinese, to reason that the more flour a miller makes, the better man he is, regardless of the quality produced. Also, the Chinese have no technically trained men of their own, gaining their experience simply by working in a mill and picking up information about running the machinery. Nevertheless, Chinese mills manage to keep going in spite of constant breakdowns and heavy cost of upkeep. They are driven much faster than in this country and work full capacity every day in the week with perhaps one day off for cleaning and overhaul every ten days. The grinding rolls, owing to the dirty nature of the wheat and the heavy duty imposed on them through crowding, often have to be refluted. Cleaning machinery also is frequently renewed, as it is soon worn out by the sand and dirt contained in the wheat.

The greatest drawback with Chinese wheat is its adulteration with impure matter such as sand, mud, stones, water and seeds. This is partly due to no threshing, or combine, machines being used, resulting in much dirt and dust being swept up with the wheat that has been beaten out on mud floors. The mixing of sand, water and stone is done intentionally, usually by the middleman or boatman, who may steal wheat that is in transit, substituting foreign matter. For this reason the more modern mills in China have an expensive wheat-cleaning plant consisting of scouring, sieving, washing and stoning machines. Other mills—not so up to date—dry, clean, and, in some cases, stone by hand; a very expensive process. It is only recently that flour mills have installed testing equipment outside their mills for ascertaining any adulteration. The Chinese, however, have realized the evil of adulteration and a wheat association is now in course of formation for the grading of wheat and the prevention of adulteration. However, this will take some time—a matter of years—before it will be possible to get people in the interior to fall into line.

Only one mill in China, as far as the writer knows, is equipped with the latest patent conditioner-dryer (the Simon conditioner-dryer), the others having only washing, except a few with dryers. The mill in question is the Foo Foong flour mill, which is the most up to date of its kind in the Far East. The object of this patent conditioner-dryer is to regulate the moisture content of the

A matting covered stack replaces the elevator or bin for storage of Chinese wheat

Imports of Wheat Into China

From:	1928 Piculs[1]	1928 H. Taels[2]	1929 Piculs	1929 H. Taels	1930 Piculs	1930 H. Taels
Canada	789,799	2,909,177	4,244,679	15,428,059	960,488	4,714,942
United States	113,248	429,412	415,366	1,690,957	556,948	2,433,631
Australasia	.....	.....	994,540	4,275,888	1,244,614	5,681,208
Total, including others	903,088	3,338,886	5,663,846	21,430,785	2,762,240	12,830,690

Wheat Flour Imported Into China

	1928 Piculs[1]	1928 H. Taels[2]	1929 Piculs	1929 H. Taels	1930 Piculs	1930 H. Taels
Hongkong*	1,385,732	6,659,491	1,281,277	6,308,231	993,177	4,988,930
Japan	1,734,900	9,330,198	3,205,643	16,776,941	1,612,675	9,666,885
Canada	1,219,655	6,436,428	3,125,577	16,770,322	420,634	2,664,290
United States	1,527,635	8,414,232	4,138,309	22,006,000	2,028,160	12,145,846
Total, including others	5,984,903	31,464,402	11,935,296	62,903,863	5,188,174	30,354,716

*Hongkong is a port of transhipment.

Value and Sources of Agricultural Machinery Imported Into China

	H. Taels[2]	H. Taels	H. Taels
United States	258,209	501,134	308,750
Great Britain	109,430	205,985	287,273
Germany	107,766	349,539	308,125
Russia	225,900	185,000	349,800
Japan	77,355	108,661	102,453
Total, including others	751,871	1,421,293	1,492,431

[1]Picul = 133⅓ lb. [2]Haikwan Tael = 1928, $0.71; 1929, $0.64; 1930, $0.46.

wheat through the whole of the berry. During July and August, when the new crop is harvested, moisture is intense, owing to the humidity of the climate. Moreover, the wheat is harvested so green—the idea being to get better weight—that in cases where such machinery is not used, the wheat has to be sun-dried before it is fit to be ground. It may be laid in the compound of the mill or on the roof, or both.

So far, no elevators have been erected anywhere in China for collecting grain, as the industry has not yet advanced to an extent to make this necessary or perhaps even profitable enough to attract the Chinese. This, however, will come in time with the development of railways. At present the wheat goes in small boats of 1-ton capacity to the collecting stations, where it is bagged and shipped in junks, each holding 15 to 20 bags of wheat, finally reaching the mills in the bigger towns. All flour mills are accordingly built on the bank of a creek or river and in this respect are better placed than mills at home; in fact, they have to be, as all transportation of wheat is by water, which is much cheaper than any other form of transportation and very low compared with costs of shipping in other countries outside of the Far East.

The buildings of Chinese flour mills are gradually becoming modernized in so far as more reinforced concrete is used in place of other material. Those of recent construction even have reinforced concrete floors to make them fireproof. Flour mills in China are not heated in summer or winter and the result is that there is no such thing as an even temperature, though the climate is not favorable for milling in summer, when the humidity is very great.

The Chinese consider a flour mill as a good investment and they reap handsome profits. Flour mills in China would pay even better were they to employ better millers and use more and better machinery. In fact, it would pay the Chinese to employ foreign millers. The Foo Foong flour mill of Shanghai, where an expert British miller is in charge of the milling side of the business, is ahead in profits at least five taels (a tael is about one-third of a dollar) per 100 bags of flour milled over any other Chinese mill, due to good milling and having the latest machinery installed. Also, between some of the older Chinese mills and the modern mills in China there is a wide margin of horsepower required. In the older mills as little as ten bags of flour are produced per horsepower as against as much as twenty bags in the more modern plants.

The Foo Foong flour mill produces 22,000 bags of flour (49 lb. to a bag) per day, working 24 hours daily.

Labor employed in the flour mills of China is very much cheaper than in any Western country. The average Chinese miller receives $60 (Chinese currency, or somewhat less than $30, U. S. currency) a month and an ordinary hand from $15 to $20 a month. The men are trained in the mill itself but are not educated, most of them being ordinary coolies. They work by rule of thumb and copy what they see others do.

China offers good scope for more flour mills, as the consumption of wheat products is steadily growing. Erecting mills in China presents no difficulties and is much cheaper than elsewhere, as suitable labor is both plentiful and inexpensive, and satisfactory under proper supervision. The probability is that future mills in China will be smaller and not so centralized as those already built, being distributed more among the interior towns, each town having its own flour mill. This will save the cost of transportation to and from the large milling centers. As it is, China imports large quantities of wheat as well as flour from Canada, the United States, and Australia, as shown by the accompanying table. Most of the flour mills in China are now operating on Canadian, Australian, or American wheat, as it is cheaper than Chinese wheat and yields a greater percentage of flour, for this foreign wheat is superior in quality, the bran is not so thick and it is free from adulteration.

Equipment in the most modern flour mill in China, the Foo Foong mill at Shanghai

Loading flour into junks, or small barges, a universal form of transportation in the Far East

ABSTRACTS OF CURRENT LITERATURE

DRIED FRUITS IN THE TROPICS. P. F. Nichols and H. M. Reed. *Western Canner and Packer*, Vol. XXIII, pp. 11-13, and Vol. XXIII, pp. 26-30; September and October, 1931.

Samples of dried apples, apricots and pears from the same commercial lots were packed in paper cartons, parchment-paper lined and paper covered; in No. 2 cans, enameled inside and out; in the same sized cans but under a vacuum of about 29 in., and in No. 2 cans filled with hydrogen. The packed fruit was shipped part to Manila, part to Singapore, and part was kept at Berkeley, Calif. Of cases of packed fruit sent to Manila and Singapore, some were examined at their destination and others stored, and still others returned to the United States for examination. The results of experiments showed that the cartons tried were unsatisfactory for dried fruit storage under tropical conditions because they were not insect-proof. The preservation of color in all the fruits was proportional to the sulphur dioxide content. The critical sulphur dioxide content seemed to be 500, 1,000 and 1,200 parts per million for apples, apricots and pears, respectively. Apricots deteriorated most rapidly and apples least rapidly. It is recommended that sealed tin or glass containers be used for dried fruit shipments to the tropics and that the minimum sulphur dioxide content for apples be 1,000 parts per million, and for apricots, peaches and pears, 2,000 parts per million. Vacuum-packed cans give the best protection. Cold storage facilities, whenever available, should be used for dried fruit in tropical countries.

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ETHYLENE TREATMENT OF TOMATOES. E. F. Kohman. *Industrial and Engineering Chemistry*, Vol. 23, pp. 1112-13; October, 1931.

Ethylene and propylene were found to be without effect on the rate of development of red color on tomatoes unless they were picked at such an immature stage that they would not have developed red color for some time if left on the vine. Such tomatoes would not be suitable for canning because of low yield and poor quality.

* * *

CORROSION BY FRUIT PRESERVES. H. Serger. *Konserven Ind.*, Vol. 17, pp. 621-3 (1930) [From *Chemical Abstracts*, Vol. 25, p. 5717; Nov. 10, 1931].

To evaluate the tendency of fruit juice or canned fruit to corrode, the substance is placed in a small tantalum metal dish and stirred with a zinc stirrer. The potential developing between the two metals is measured and compared with that of 0.1 normal oxalic acid. The corrosion number (d) *is* $10b/a$, where b equals the electromotive force of the fruit juice, and a equals the electromotive force of the oxalic acid solution.

CHEMICAL LEAVENING AGENTS AND THEIR CHARACTERISTIC ACTION IN DOUGHS. R. A. Barackman. *Cereal Chemistry*, Vol. 8, pp. 423-33; September, 1931.

An apparatus for determining the rate of reaction of baking powders under bake-shop conditions is described. A method for determining the total available carbon dioxide remaining in the dough for oven expansion is presented. Such results obtained are in general agreement with the results of baking tests. About 70 to 80 per cent of carbon dioxide generated from baking powders during the mixing of doughs is lost. The remainder of the gas is available for expansion at oven heat.

* * *

VITAMIN A CONTENT OF BODY OILS OF PACIFIC COAST SALMON. R. W. Truesdail and L. C. Boynton. *Industrial and Engineering Chemistry*, Vol. 23, pp. 1136-37; October, 1931.

The vitamin A content of five samples of salmon body oils has been determined by biological assay. Results show chinook and sockeye oils contain more vitamin A than silver, humpback, or chum oils. All the salmon body oils tested were found to be decidedly inferior to a medicinal cod-liver oil of high grade as a source of vitamin A.

* * *

RANCIDITY CHANGES AND THE FLAVOR OF FATS. C. R. Barnicoat. *Chemistry and Industry*, Vol. 50, pp. 361T-365T; Sept. 25, 1931.

The addition of free fatty acids in proportions up to 10 or 15 per cent has been found to have no harmful effect on the flavor of the animal fats examined. The active oxygen and Kreis values at which rancidity becomes perceptible vary greatly, (a) for a given fat exposed to different conditions of temperature and light, and (b) for fats of different composition when subjected to identical conditions. Exposure to direct sunlight and the relative absence of acids less saturated than oleic both favor the early production of rancidity.

* * *

THEORY OF JELLY FORMATION. S. Prakash. *Chemistry and Industry*, Vol. 50, p. 387T; Oct. 9, 1931.

The formation of organic jellies, as starch, gelatin and pectin, appears to be guided by the two factors agglomeration and hydration. When there is agglomeration alone, precipitation occurs; when hydration is slight and agglomeration predominant, a gelatinous precipitate is formed, and when hydration predominates over agglomeration, opaque or opalescent jellies are formed. When agglomeration is negligible in comparison with hydration, transparent jellies are formed, and these maintain their transparency for a long time.

MANUFACTURE OF GLUCOSE FROM THE MANIHOT ROOT. A. E. Williams, *Industrial Chemist*, Vol. 7, pp. 375-377; September, 1931.

The two chief methods of producing glucose from the manihot root are described. In process No. 1, the crushed root is given a preliminary treatment with boiling water to soften the material. It is then treated under pressure with a small percentage of hydrochloric acid, the acid being subsequently neutralized, while the resultant weak glucose liquor is filtered from the fibrous matter, decolorized, and concentrated in an evaporator. Process No. 2 consists of first extracting the starch from the coarsely ground-up root, by treatment with alkaline liquor and settling, and then treating the extracted starch, instead of the root, in the converter, as in process No. 1. The product resulting from process No. 1 is satisfactory for use in the confectionery trades, while that yielded from process No. 2 is preferable for the production of crystalline glucose.

* * *

THE EFFECT OF THE RATE OF BOILING ON THE RESIDUAL SULPHUR DIOXIDE CONTENT IN MIXTURES OF SUGAR AND CORN SYRUP. R. H. Morgan. *Analyst*, Vol. 66, pp. 638-46; October, 1931.

Rapid boiling was used in this work, since unnecessary delay in the boiling process causes discoloration of the resulting product. Tabulated data show that a constant residual amount of sulphur dioxide is soon reached, and that continued boiling reduces this value only slightly. Use of both bisulphite and hydrosulphite bleaches caused a considerable increase in the residual sulphur dioxide content of the various boilings when compared with boilings to which no bleach had been added.

* * *

PRODUCTION OF STARCH FROM SWEET POTATOES. R. T. Balch and H. S. Paine. *Industrial and Engineering Chemistry*, Vol. 23, pp. 1205-1213; November, 1931.

At the present time 10 to 30 per cent of the sweet-potato crop is graded as culls and hence wasted or inadequately utilized. A procedure has been devised for manufacturing starch whereby objectionable color can be largely eliminated from the starch, regardless of the color of the potato flesh. The method involves utilization of sulphur dioxide in the water used in grinding the potatoes. The other operations of purifying and drying the starch are essentially the same as for production of white-potato starch. Photographs of laboratory and semi-commercial equipment suitable for production of sweet-potato starch are shown. For textile purposes this product is equivalent to imported high-quality white potato starch.

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CAROTENASE. THE TRANSFORMATION OF CAROTENE TO VITAMIN A. H. S. Olcott and D. C. McCann. *Journal of Biological Chemistry*, Vol. 94, pp.185-193; November, 1931.

Carotene can be changed to vitamin A by incubation with fresh liver tissue or with an aqueous extract of liver. It appears that an enzyme is responsible for the transformation, since the active agent is destroyed by heat.

BOOK REVIEWS

FACTORS FOR CONVERTING PERCENTAGES OF NITROGEN IN FOODS AND FEEDS INTO PERCENTAGES OF PROTEINS. By D. Breese Jones. Published by U. S. Department of Agriculture, Washington, D. C., August, 1931, as Circular No. 183C. 21 pp., 5¾x9¼ in.; paper; 6 tables.

FOR many years the common practice among chemists for estimating the quantity of protein in foods and feeds has been to multiply the percentage of nitrogen determined analytically by the factor 6.25. This assumption that all protein contained 16 per cent nitrogen had its foundation on the isolation and analyses of a comparatively few proteins known to chemists at that time. During later years discovery has been made that nitrogen other than protein nitrogen occurs in food materials and that, instead of all proteins containing 16 per cent nitrogen, vegetable proteins have a nitrogen content varying from 13 to 19 per cent.

In this circular the protein and nutrition division of the Bureau of Chemistry and Soils gives collected data on the nitrogen content of more than 100 foods and feeds obtained from plant and animal sources. The new protein conversion factors are based upon information obtained by actual isolation and study under Dr. Jones' supervision and from other sources equally reliable. Although these factors of conversion may not give protein values that are technically correct, for practical purposes the values will be more accurate than those obtained when the generic factor 6.25 is used. A 6-page bibliography of literature pertaining to proteins is included.

Food chemists and research men may obtain a copy of this circular without charge from the Office of Information, U. S. Department of Agriculture.

* * *

THE TREATMENT OF CANNING WASTES. Prepared and published by Division of Sanitation, New York State Department of Health, Albany, N. Y. 1930. 101 pp., paper.

EXPERIMENTS carried out by the New York State Department of Health since 1927 have resulted in a report which presents sufficient data and cost information to permit sanitary engineers to design an economical plant of adequate capacity to treat cannery waste. The work has been carried out at plants packing peas, green beans, tomatoes, various fruits, and red kidney beans.

Recommendations and conclusions are expressed both in terms of cannery production and also in terms of 100,000 gal. of waste per day, which is considered the average amount produced by a two-line plant in a 12-hour day.

The common-sense recommendations of avoiding wastage of raw materials through carelessness and slop is made in order to avoid the creation of waste, as well as the conservation of the use of water to avoid dilution of the waste. Screening, filtration, precipitation, and chlorination have been studied in detail. Apparently, the best procedure involves fine screening passage of effluents through trickling filters at a rate not greater than two million gallons per acre per day. Lower rates are necessary if final dilution of the effluents is less than 1 to 20.

Chemical precipitation is sufficient when the final dilution is not less than 1 to 25. Final chlorination is equivalent to removal of 30 per cent of unstable organic material. Suggested designs of filtration and precipitation plants are presented together with 28 tables of data.

* * *

NUTRITION AND FOOD CHEMISTRY. By Barnard S. Bronson, State College for Teachers, Albany, N. Y. Published by John Wiley & Sons, 440 Fourth Ave., New York, N. Y., 1930. 467 pp., 6½x9¼; cloth. 34 illustrations. Price, $3.75.

ANY manufacturer or processor of foods who desires to know the inherent food value of his materials and is interested in nutrition and food digestion will find this book more complete than those that have previously appeared. The information is interestingly presented in a clear, easily read type and references to sources are given at the bottom of each page for the benefit of the more studious reader.

As might be judged from the title, the author had the student of nutrition particularly in mind while the material for the book was being prepared and arranged. Nevertheless, anyone actively interested in food and food values as well as the chemistry of food digestion will not go amiss by adding it to his library. The material is presented so that one with a fundamental knowledge of physiology and practically no organic chemical knowledge will have little difficulty in learning much about nutrition and its future trends.

The many tables with which the book abounds give composition data that are especially valuable to investigators and students of food products. This material is made readily available by a relatively complete index.

* * *

COMMUNITY PLANNING IN UNEMPLOYMENT EMERGENCIES. Compiled by Joanna C. Colcord. Published by Russell Sage Foundation, 130 East 22d St., New York, N. Y., 1930. 90 pp., 6x9 in.

HOW the effects of widespread unemployment may be alleviated is the burden of this report prepared by the charity organization department of the Russell Sage Foundation. It embodies recommendations resulting from recorded experiences during previous unemployment periods and from study of emergency relief measures under way in American cities. The report proposes machinery for emergency relief that can be quickly set up by each community for itself to function not only in the present situation but in any future depression as soon as the described signs of an emergency become apparent.

One of the precautionary measures that are specifically mentioned is the strengthening of credits. The report states: "Many small retail dealers, especially in food, and many landlords in a time of unemployment seriously exceed the limit of safety in extending credit. The situation thus created reflects in tightened credit relations from producer through wholesaler, jobber, retailer, down to the unemployed consumer. A subcommittee of bankers and distributors, with means of guaranteeing extension of credit, might considerably ease the local pressure by credit grants, judiciously made to dealers on the basis of overextension of credit to the unemployed."

Recommendations as to how individual business firms can improve the unemployment situation and a bibliography of books and pamphlets quoted in the report are included.

* * *

PROBLEMS IN SALES MANAGEMENT. By Harry R. Tosdal. Third Edition. Published by McGraw-Hill Book Co., Inc., 330 West 42d St., New York, N. Y., 1931. 968 pp., 6x8¾; cloth. Price, $6.

IN no other period in the history of American business has distribution been of such paramount importance. The solution of the present distribution tangle can come about only through intelligent sales management and then only after the subject of sales management has been mastered in all its ramifications.

Our strongest impressions come from those things we experience ourselves. Our next strongest come from a study of the experiences of others. We naturally draw these impressions from those experiences of others that are more nearly akin to the ones we are or anticipate experiencing. At the same time we cannot help having our thought process stimulated by studying the successes or failures of others in widely dissimilar lines of endeavor.

Prof. Tosdal, in the third edition of his book, "Problems of Sales Management," presents the subject in all its phases of merchandising and merchandising policies, sales research, market analysis, distribution, prices and terms of sale, sales planning, sales methods, sales organization, management of sales force, and control of sales operations. Each general topic is broken down into its logical subdivisions and expertly illustrated with problems taken from actual business enterprises.

The Harvard School of Business Administration is noted for its researches into actual business problems, and through his work as professor of marketing, Mr. Tosdal has been able to collect and present in his latest edition almost an entirely new collection of going business problems; presented, for obvious reasons, in many cases under an assumed name. These examples are carefully selected so as to illustrate clearly the principles set up by that division of the general subject under discussion and are sufficiently diversified so as to give, in many cases, at least one example of several of the major divisions of business. The very diversity of actual cases gives the reader a broad and definitely thought-provoking set of examples so as to give him light on any angle of his own particular problem.

M. A. WILLIAMSON.

THIS MONTH—

FEBRUARY

1-2—Potomac States Bakers' Association, Lord Baltimore Hotel. Baltimore, Md.

8-11—Associated Bakers of America (Retail Bakers' Week and Exhibit), Jefferson Hotel, St. Louis, Mo.

10-11—National Cheese Producers' Federation, Madison, Wis.

11—Eastern Confectioners' Traffic Bureau, New Yorker Hotel, New York, N. Y.

22-23—Eastern Federation of Feed Merchants, Hotel Onondaga, Syracuse, N. Y.

Hors d'Oeuvres

THE PACKERS' CONSENT decree, Ypres of legalistic warfare, will bring the heaviest artillery into action on Feb. 29 when the finish fight begins before the Supreme Court of the United States. Wholesalers, allied with the Department of Justice, will seek revocation of the modification permitted last spring. Packers will fight for further relief. Lawyers will send bills to both.

•

CLINKING of milk bottles, clumping of milkmen's heels, and rattling of the wagon, long symbols of break-of-dawn activity in city life, may soon join the ring of the smithy's hammer in the limbo of forgotten sounds. Borden's Farm Products Co., having tested silencing methods on New York streets, now plans to adopt rubber insulated bottle carriers, rubber tired wagons. Drivers will wear rubber heels.

•

THE SENATE food price inquiry, which played statistical penny ante over bread costs with a number of food men at the last session of Congress will not be resumed immediately. Although authorization was given the subcommittee to continue its investigation of the spread between agricultural and retail prices of food materials, action will be delayed until "more pressing matters" are given attention, according to Senator Capper, the chairman.

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COFFEE compressed into bricks will be tried out as a fuel on the government-owned Central Railroad of Brazil as another means of disposing of surplus stocks of lower grades. Firemen, presumably, may soon be indorsing the blend that "gives my engine extra energy."

•

GRADE A BUTTER, in the Navy, wasn't so good. The Federal Specifications Board, for some strange reason, used Grade C for sweet cream butter scoring not less than 94, Grade B for butter scoring not less than 92, Grade A for butter scoring not less than 90. Because bidders were confused, it has now reversed the order—Grade A is now top quality, as in commercial grading practice.

What Food Men Are D

Canners Seek Control—Small Plants in t

Pat. Pending Under Attack—Cub Wai

Is Bootlegged—Disc

NECESSITY for some system of adjustment and control in the canning industry was paramount in the minds of canners as they gathered in Chicago last week. High production in 1930 brought practically no profit. Lower production in 1931 is bringing even less. The conviction grows that orderly marketing and reasonable profits cannot be left to vagaries of individual judgment.

At the behest of the board of directors of the N.C.A., President Francis A. Harding on Jan. 25 appointed a committee of sixteen canners to consider a method of adjustment. Ben C. Knott, of W. R. Roach & Co., Grand Rapids, Mich., was named chairman. The committee immediately went into session with Nils A. Olsen, chief of the Bureau of Agricultural Economics, to consider a system of statistical reports that will aid in production control.

Consumer advertising of the association will be shifted soon from national magazines to newspapers. Magazine advertisements will conclude with March issues; newspaper campaigns running eight to twelve weeks will begin in 52 cities on Feb. 18.

At the meeting for election of officers on Jan. 25, Marc C. Hutchinson, of Fennville, Mich., sales manager of Michigan Fruit Canners, Inc., was elected president to succeed Mr. Harding. Mark Ewald, Olympia Canning Co., Olympia, Wash., succeeds Mr. Hutchinson as first vice-president. Leonard E. Wood, California Packing Co., is second vice-president. Frank E. Gorrell continues as secretary-treasurer.

BOOTLEGGING of margarine is reported to be assuming large proportions in some states where it has been subject to drastic tax measures. In the State of Washington, for instance, where the tax is 15c. per pound, the following practice has come to light:

A consumer leaves an order with his grocer for a quantity of margarine. The grocer sends the order out of the state, has the product shipped to the purchaser by parcel post or express. Because it enters under interstate commerce, state authorities are powerless to tax it.

Anti-margarine interests in Washington are now proposing a change in interstate commerce regulations to prohibit such shipments from "duty-free" states. It is also proposed to put a tax on agents.

SMALL PLANTS having low capital investments seem most likely to succeed in the development of food-processing industries in the South, according to a number of those interested in the plan for expansion of food production in North Carolina. A committee appointed by Governor Gardner has recently launched studies to determine to what extent it may be profitable to produce at home processed foodstuffs now largely imported.

Lack of an agricultural population having either the ability or the desire to produce quality raw materials in sufficient quantity to make commercial operations worth while has been the chief handicap to expansion in the past. The experience of one plant, however, indicates that this can be overcome by educational work among the growers. Climatic and soil conditions in the state appear favorable for a large number of fruits and vegetables.

Dairying has already received considerable impetus. Several milk-products plants that have been established are reported to be doing better than the average for the country. Further expansion in this and other branches of food processing is expected to accompany improvement in general business conditions.

PAT. PENDING, that well-known industrial Celt to whom everything from can openers to generators has paid obeisance, may soon become a less prominent figure. Congress plans to renovate the patent laws; use of Pat. Pending to extend indefinitely the legal period of protection by allowing applications to hang fire after filing probably will lose its advantages.

One proposal would limit protection to 20 years from date of *filing* (present law, 17 years from date of *issue*). Another would regard as abandoned all claims not put in condition for patent issuance within a specified time, permit the Commissioner of Patents to order that applications pending three years be placed in condition for allowance or appeal on 30 days' notice.

Help from industrialists in developing a more satisfactory law is being sought by Representative William I. Sirovich, chairman of the House Committee on Patents. Extended hearings, from Jan. 20 to March 1, will be held. All interested are being urged to give their views. For those living at a distance, definite engagements for hearings will be made.

CUBA WAITS anxiously for the report on Java's sugar plantings and sowings for the coming season. Upon it may hang the fate of the international sugar conference to revise the Chadbourne plan to present levels of consumption. The conference was supposed to meet again on Jan. 5 to hear the report. When it had not been submitted late in the month, Cuba was said to have threatened to withdraw.

Meanwhile, although Thomas L. Chadbourne, conferring in Cuba, continues optimistic, many Cuban producers are skeptical, feel that further restriction of Cuba's

Doing and Saying

in the South—Dairymen's Woes—Waits and Wonders—Margarine Discuss Bacteria

crop will mean ruin. Curtailment to 2,180,000 tons probably will be required of Cuban producers, although the original plan set next season's crop at 3,500,000 tons.

Decreases in consumption that made the original plan ineffective are exemplified in 1931 United States figures, estimated by Lamborn & Co. Consumption dropped 3.54 per cent, imports from Cuba declined 423,000 tons. Domestic beet production, aided by tariff, unhampered by restriction, gained 161,000 tons.

FEWER FIGURES will be necessary on the 1931 Census of Manufactures questionnaire, blanks for the compilation of which are now being mailed by the Census Bureau. This will be due not only to general decreases from the 1929 levels of activity but to a simplification of the questions asked.

As this year's figures do not fall within the decennial series (as did 1929), there are only four major items: Wage earners employed, by months; wages paid; cost of materials, fuel, and purchased electric energy; products by quantity and value.

Value of the returns will be chiefly determined by their timeliness. For that reason, the Bureau urges promptness in returning the questionnaires.

IF SWISS CHEESE in your sandwich is mostly holes, there's a reason other than thrifty management. Effect of "eye-forming" bacteria in Swiss cheese was among the subjects of interest to food manufacturers discussed at the Baltimore convention of the American Society of Bacteriologists. W. C. Frazier and Helen U. Wing, U. S. Bureau of Dairy Industry, told what makes the holes. A method of packaging rindless cheddar cheese to prevent mold growth by the use of a valved tin can was described by L. A. Rogers, U. S. Bureau of Dairy Industry.

Newspaper accounts of the meeting brought much unfavorable publicity to frozen foods by superficial interpretations of an interesting paper by Lawrence H. James, U. S. Bureau of Chemistry and Soils. The fact that quick-freezing botulinus spores does not kill them made the headlines, although most of those familiar with the subject were not surprised to hear it. Dr. James froze spores in a Sörensen buffer solution (pH 6.9). None was killed, nor was toxin liberated.

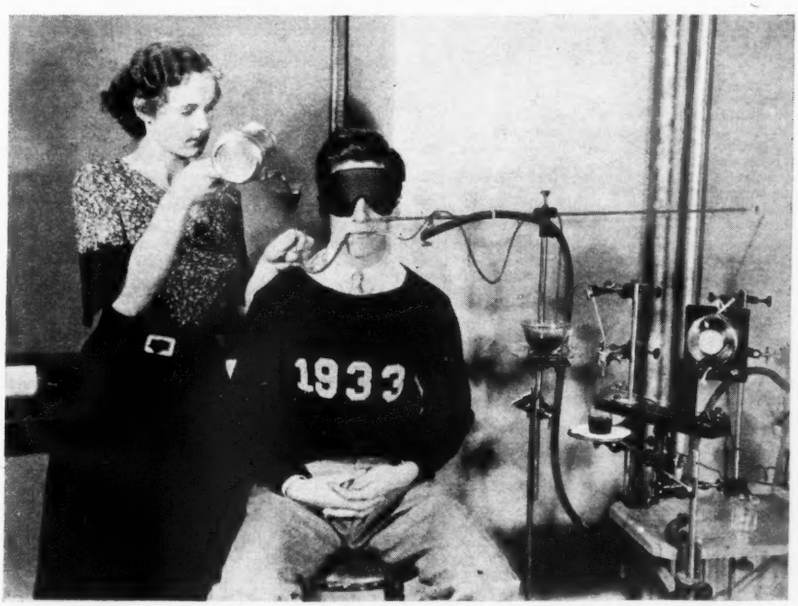
Pasteurization at 160 deg. for 60 minutes with relative humidity above 70 per cent solves the date-souring problem, C. R. Fellers and J. A. Clague, Massachusetts State College, told the bacteriologists. A paper by Carl S. Pederson and C. D. Kelly, New York Agricultural Experiment Station, asked for better quality commercial sauerkraut, told of qualitative tests that make it possible.

A peculiar type of cream spoilage, occurring only at refrigerator temperatures, was reported by J. A. Anderson, Rutgers University, and J. G. Hardenburg, Walker Gordon Laboratories. The cream acquires a bitter flavor, irritates the throat. The bacterium responsible hydrolyzes fats. A water or soil origin is indicated.

CANNED FRUIT PULP for use by ice cream factories, at soda fountains, and in the home can now be prepared by a comparatively simple process. In the Fruit Products Laboratory of the University of California, where it was developed, the product is regarded as superior to frozen-pack for most fruits with the exception of berries. Samples retained flavor and color for more than three years, did not deteriorate rapidly when the container was opened. Using standard cannery equipment, the new process is recommended for peaches, pears, apricots, plums, dried prunes.

WOES OF DAIRYMEN followed their usual course during the past month, resulting in much newspaper space and pleas for political action in several Eastern states. At the office of Governor Ely, of Massachusetts, representatives of five New England states made plans to develop an organization "that will insure New England milk producers of a reasonable price for their product." The members of the Permanent Advisory and Arbitration Board have taken up the problem of establishing New England Dairies, Inc., as an agency to accomplish this purpose. Most producers have agreed to seek a price of 6c. a quart.

The Rhode Island Cooperative Dairymen's Association, apparently skeptical of a successful plan for New England as a whole, has sponsored a bill in the Rhode Island Senate, providing that no milk not pasteurized within the borders of the state may be sold therein. The present law provides that pasteurization may be carried on only in plants licensed by the Commissioner of Agriculture, but does not prevent entrance of milk from registered plants in other New England states. Another blow aimed at importation of milk from other



When annoyed by noise, have a cup of coffee. So the Acoustical Society of America was told by Dr. Donald A. Laird, Colgate University psychological laboratory head. Though it may be a horrid word, Dr. Laird measured salivary gland secretion, found that it was greatly decreased by noisy surroundings—a clue to nervous indigestion. Further tests showed that taste and aroma of coffee, also the taste of sweets, bring it back to normal. Robert Jordan, cross-country runner is here shown furnishing scientific saliva, blindfolded to shut out visual influences such as that furnished by Helen Boris, who poured.

—AND THE NEXT

MARCH

1-16—Fourth Triennial Congress of the International Society of Sugar Cane Technologists, San Juan, Porto Rico.

7-12—Second Packaging Exposition, Conference, and Clinic (American Management Association), Palmer House, Chicago, Ill.

14-17—American Society of Bakery Engineers, Edgewater Beach Hotel, Chicago, Ill.

16-19—Canners' League of California, Del Monte Hotel, Del Monte, Calif.

states is seen in a clause prohibiting bottling of raw milk in a pasteurizing plant without special permission.

"A sweeping legislative investigation" concerning the milk price situation has been urged in New York by Governor Roosevelt's special agricultural advisory committee, following a public hearing. It is planned to create a commission of two State Senators and three Assemblymen, with a $50,000 fund, to study the matter. At the hearing, the Dairymen's League defended itself from charges that it is a profiteering monopoly.

In the Buffalo (N. Y.) area, where price to producers has been forced to as low as 1.7c. a quart, a trend back to direct distribution methods is noted. One farmer with a 100-cow herd, for example, equipped a bottling plant, got a city license, and is now said to be making a profit by direct sale to consumers.

In contrast to domestic conditions, a Commerce Department report from England predicts a milk shortage before the winter is over. New contract prices in effect since Oct. 1 have discouraged producers, reduced average yield 20 to 30 per cent. Retail prices in London have recently been raised from 6d. to 7d. per quart.

THE MOST EFFECTIVE PACKAGE developed and placed on the market since Jan. 1, 1929, will be awarded the Irwin D. Wolf trophy by the American Management Association, following the contest which closes on Feb. 15. It is expected that a number of food packages will be entered in the competition. Group awards for set-up boxes, folding boxes, glass containers, molded containers, open display containers, paper and transparent bags, cans, new materials, and the like, will also be made.

Entries will be exhibited at the Art Center, New York, N. Y., from Feb. 15 to March 6. The award will be announced during the Second Packaging Exposition and Clinic, to be held at the Palmer House, Chicago, Ill., March 7 to 12. A selected group of the packages entered will thereafter be displayed in a number of cities throughout the country.

INDUSTRY-WIDE guarantees administered by trade associations and professional societies are continually assuming greater importance, according to an American Standards Association survey of certification and labeling activities. Over four billion dollars' worth of agricultural commodities and food products were sold last year under guarantee or grading systems of one kind or another. The January A.S.A. *Bulletin* gives an extensive table listing certification and grading activities.

NEW DEFINITIONS and standards for strained tomato products have been proposed by the Food Standards Committee. The committee invites criticisms and suggestions on the proposed definitions from food officials, consumers, and the trade. Communications should be addressed to A. S. Mitchell, secretary, Food Standards Committee, Federal Food and Drug Administration, Washington, D. C. The proposed definitions are as follows:

STRAINED TOMATO is the unconcentrated product consisting of the entire pulp and liquid, exclusive of skins, seeds, and cores, obtained from ripe tomatoes with or without the application of heat; and with or without the addition of salt. It is packed in hermetically sealed containers and processed by heat.

TOMATO PUREE, TOMATO PULP, is the product resulting from the concentration of the entire fleshy and liquid portions of ripe tomatoes, exclusive of skins, seeds, and cores, with or without the addition of salt. The finished product contains not less than 8.37 per cent of tomato solids.

TOMATO SAUCE, "SALSA," is the product resulting from the concentration of the entire fleshy and liquid portions of ripe tomatoes, exclusive of skins, seeds, and cores, with or without the addition of salt, and with or without the addition of basil and/or other seasoning. The finished product contains not less than 16 per cent of tomato solids.

TOMATO PASTE, "PASTA," is the product resulting from the concentration of the entire fleshy and liquid portions of ripe tomatoes, exclusive of skins, seeds, and cores, with or without the addition of salt, and with or without the addition of basil and/or other seasoning. The finished product contains not less than 22.0 per cent of tomato solids.

HEAVY TOMATO PASTE, CONCENTRATED TOMATO PASTE, "CONCENTRATO," is tomato paste containing not less than 35.0 per cent of tomato solids.

"NON - ESSENTIAL" agricultural and horticultural products imported into England will now pay duty. A list upon which duty is now or will soon be effective has been announced by the U. S. Department of Commerce. It includes fresh cherries, currants, gooseberries, plums, strawberries, hothouse grapes, and fresh asparagus, green beans, broccoli, cauliflower, carrots, chicory, cucumbers, endive, lettuce, mushrooms, green peas, new potatoes, turnips. No manufactured or processed foods are included in the list. The order is designed to restrict imports of seasonal shipments which anticipate home crops; duties vary with the season.

Distribution of Sales, 1929, in the Beverage Industry

(Released by the U. S. Bureau of the Census)

	Selling Value (F.o.b. Factory)	Per Cent of Sales	Number of Plants
Total	$270,324,000	100.0	5,154*
Sales to manufacturers' own wholesale branches†	10,573,000	3.9	150
Sales to manufacturers' own retail branches	4,207,000	1.5	144
Sales to dealers:			
Wholesalers	71,234,000	26.3	720
Retailers	165,853,000	61.4	4,253
Sales to consumers:			
Large (buying at wholesale)	6,395,000	2.4	276
Household	12,062,000	4.5	1,031
Total	$270,324,000	100.0	5,154*
Sales made through manufacturers' agents, selling agents, brokers, or commission houses	10,115,000	3.7	93
Sales direct to sales branches, dealers, or consumers	260,209,000	96.3	5,119

*The total number of manufacturing plants included in the Census industry classification engaged primarily in the manufacture of beverages is 5,154. Inasmuch as some plants sell in more than one way, this figure is less than the total of the figures shown below it.

†This report does not show the distribution of sales of manufacturers' own sales branches.

Distribution of Sales, 1929, of the Manufacturing Plants in the Condensed and Evaporated Milk Industry*

	Selling Value (F.o.b. Factory)	Per Cent of Sales	Number of Plants Total	Number of Plants Selling Exclusively as Indicated
Total	$293,035,000*	100.0	535†	....
Sales to manufacturers' own wholesale branches‡	105,071,000	35.9	230	87
Sales to manufacturers' own retail branches	17,620,000	6.0	40	18
Sales to dealers:				
Wholesalers	124,339,000	42.4	332	121
Retailers	19,163,000	6.5	104	6
Sales to consumers:				
Industrial (bakers, other manufacturers, etc.)	17,563,000	6.0	126	27
Household§	9,279,000	3.2	72	2

Of the total sales, except those to manufacturers' own sales branches or to household consumers, $28,151,000 was made through manufacturers' agents, selling agents, brokers, or commission houses by 66 manufacturing plants, 12 of which sold their entire output in this way.

*These sales include $83,925,000 worth of dairy products purchased and marketed by the plants in the industry.

†The total number of manufacturing plants engaged primarily in the manufacture of condensed and evaporated milk is 535. Inasmuch as some plants sell to more than one type of customer, this figure is less than the total of the figures shown below it.

‡This report does not show the distribution of sales of manufacturers' own wholesale branches.

§Sales to household consumers consist largely of milk and other dairy products purchased and marketed by 257 of the plants in the industry.

Distribution of Sales, 1929, in the Cheese Industry*

	Selling Value (F.o.b. Factory)	Per Cent of Sales	Number of Plants Total	Number of Plants Selling Exclusively as Indicated
Total distributed sales	$120,703,000*	100.0	2,352†	....
Sales to manufacturers' own retail branches	1,950,000	1.6	45	23
Sales to wholesalers and to branch or other wholesale establishments owned or controlled by, or affiliated with, the plant‡	92,231,000	76.4	1,937	....
Sales to retailers	7,978,000	6.6	229	49
Sales to consumers:				
Industrial (manufacturers of food products, hotels, restaurants, etc.)	9,697,000	8.1	356	185
Household	8,847,000	7.3	493	63
Sales through manufacturers agents, selling agents, brokers, or commission houses	4,193,000	3.5	132	60
Sales direct to sales branches, dealers, or consumers	116,510,000	96.5	2,292	2,220

*This total distributed sales figure includes the sale of $20,415,000 worth of purchased dairy products marketed by these 2,352 plants, but does not include $10,357,000 worth of sales made by the other 406 plants which were unable to classify them according to types of customers.

†The total number of manufacturing plants engaged primarily in the manufacture of cheese is 2,758; Of these, 406 did not report the distribution of their sales. Inasmuch as some of the other 2,352 plants sell in more than one way, this figure is less than the total of the figures shown below it.

‡See paragraph three of text

THE BUSINESS PAGE

Report Canned Food Stocks On January 1

CANNERS meeting in Chicago last week had available for the first time end-of-year statistics of canning stocks indicating movement of canned foods into trade channels since Oct. 1, 1931. Although the second comparative report of quarterly stock figures does not give total stocks, it represents the change in holdings of a representative cross-section of canners and distributors.

In an adjoining column is a table showing 1930 and 1931 packs of the eight items covered, which will be valuable in analyzing the comparative report shown in the tables below.

Table III—Comparison of 1930 and 1931 Packs

Basis—Cases All Sizes

Product	1930	1931
Peas (1)	21,590,054	12,972,467
Corn (1)	15,620,303	19,080,192
Tomatoes (1)	24,267,744	13,816,066
Green and wax beans (1)	7,777,704	5,777,138
Peaches, cling (2)	13,173,703	8,348,652
Pears (3)	4,266,660	3,775,730
Pineapples (4)	12,672,296	12,613,911
Salmon (5)	6,086,479	(6)

(1) U. S. total pack; collected by Foodstuffs Division, Commerce Department.
(2) California pack only; basis 24-2½'s; collected by Canners' League of California.
(3) West Coast States only; collected by State Associations.
(4) Hawaiian pack; collected by Hawaiian Pineapple Canners' Association.
(5) U. S. West Coast and Alaska; Bureau of Fisheries; basis 48-1's.
(6) Not available.

Table I—Canned Foods in Canners' Hands, Oct. 1, 1931-Jan. 1, 1932

Commodity	No. of Firms Reporting	Stocks, Sold and Unsold Oct. 1, 1931	Stocks, Sold and Unsold Jan. 1, 1932	Decrease Oct. 1 to Jan. 1 Amount	Decrease Oct. 1 to Jan. 1 Per Cent
		Cases	*Cases*	*Cases*	
Tomatoes	280	1,572,355†	3,764,870	2,192,515*	139*
Peas	121	7,004,547	5,138,855	1,865,692	27
Corn	157	10,655,698	8,438,269	2,217,429	22
Green and wax beans	181	3,500,154	2,820,251	679,903	19
Peaches	45	7,034,372	5,590,029	1,444,343	21
Pears	58	2,281,388	1,698,474	582,914	26
Pineapple	12	7,353,528	5,433,358	1,920,170	26
Salmon	34	2,387,228	1,979,872	407,356	17

* Increase.
† Does not include any 1931 pack stocks.

Table II—Canned Foods in Hands of 513 Distributors

Commodity	Stocks Oct. 1, 1931	Stocks Jan. 1, 1932	Increase Amount	Increase Per Cent	Decrease Amount	Decrease Per Cent
	Cases	*Cases*	*Cases*		*Cases*	
Tomatoes	1,406,519	1,550,177	143,658	10	.....	..
Peas	1,240,956	1,033,927	.....	..	207,029	17
Corn	1,131,421	1,175,138	43,717	4	.....	..
Green and wax beans	638,908	582,686	.....	..	56,222	9
Peaches	581,911	599,064	17,153	3	.....	..
Pears	181,275	179,847	.....	..	1,428	1
Pineapple	515,876	498,123	.....	..	17,753	3
Salmon	380,976	386,382	5,406	1	.....	..
Total above eight items	6,077,842	6,005,344	.....	..	72,498	1

Business at Standstill

In contrast to the sharp upturn in general business conditions during January of the past two years, January, 1932, indicates a stagnant condition at a much lower level. The *Business Week* index, at 64.0 per cent of normal reflects practically no change during the past month.

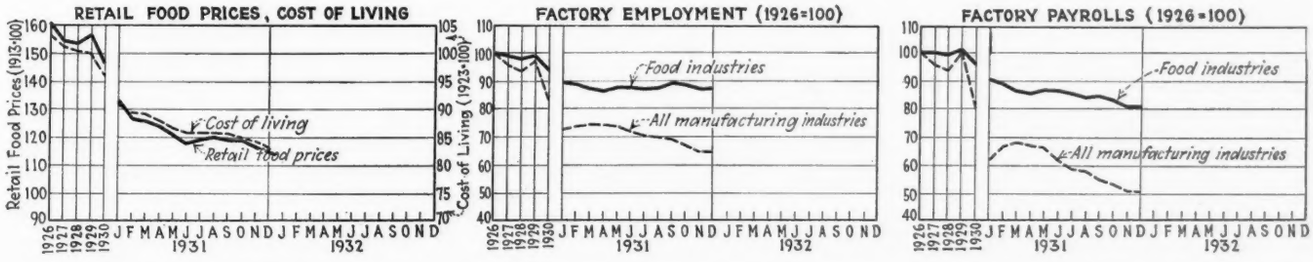
Slaughtering and meat packing alone, of the food industries, showed an increase in employment and payroll totals. This improvement, however, was offset by declines in ice cream, flour milling, baking, and cane sugar refining.

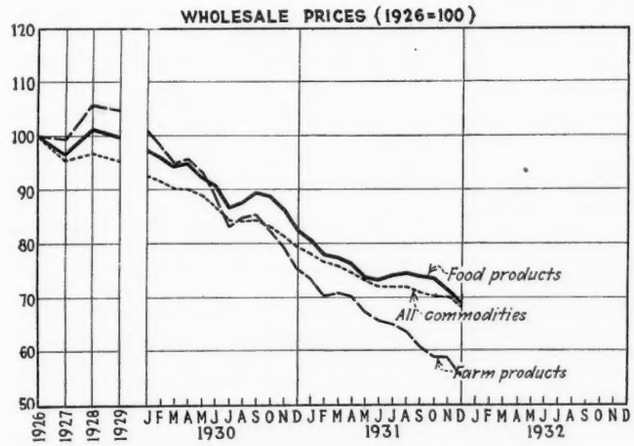
A weighted price index registers a 2.91 per cent decrease in general commodity prices and an 8.08 per cent decline in food prices for the week ending Jan. 23, as contrasted with those of Dec. 26, in spite of the slight rise in food prices during the first two weeks of January.

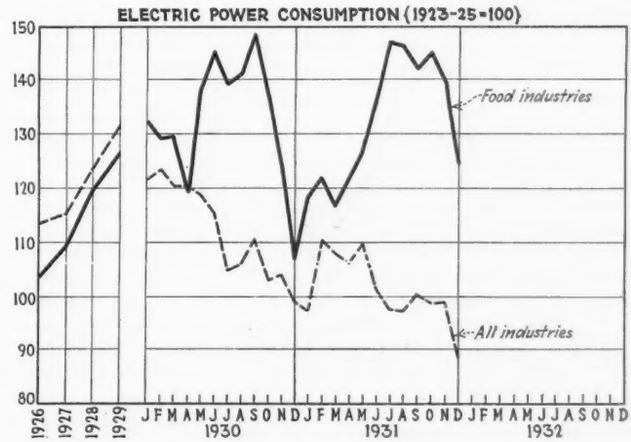
During the month of December a national food retail organization increased its tonnage sales by 0.35 per cent over December, 1930, and suffered a decrease of 8.78 per cent in dollar sales during the same period.

Basis for the Curves

Retail food prices, factory employment, factory payrolls and wholesale prices are based on indexes of the Department of Labor. Cost-of-living index is that of the National Industrial Conference Board. Electric power consumption figures are furnished by *Electrical World*. Note that the basic year and ordinate scales on retail food price and cost-of-living curves are not the same.


RETAIL FOOD PRICES, COST OF LIVING
Retail Food Prices (1913=100)
Cost of Living (1923=100)
Cost of living
Retail food prices
1926 1927 1928 1929 1930 1931 1932





TRADE NOTES

AMERICAN DAIRY SCIENCE ASSOCIATION has taken over the management of the *Journal of Dairy Science,* which has been published under its sponsorship for the past fourteen years. A committee of which O. F. Hunziker, Blue Valley Creamery Co., is chairman will direct the management. A. C. Dahlberg will continue to edit the publication.

BELLE ISLAND CREAMERY CO., INC., and GABEL-RISDON CREAMERY CO., INC., both Detroit units owned by the Borden Co., will be consolidated in a new organization to be known as the BORDEN FARM PRODUCTS CO. OF MICHIGAN. Equipment and plants of both creameries will be utilized, although management will be centralized.

BRUCE'S JUICES, INC., Tampa, Fla., has been formed by the merger of the Florida Citrus Oils Corp. and Kingsway Products, Inc.

DRYICE CORPORATION OF AMERICA, New York, N. Y., has been denied exclusive right to use of the term "dry ice," it was ruled by the U. S. Circuit Court of Appeals in a decision handed down at New Orleans, La., on Jan. 9.

FROZEN FOODS ASSOCIATION OF AMERICA has widened its activities by the organization of the Equipment Division, with headquarters in Detroit, Mich. Leading manufacturers of electrical refrigerators and display cases are sponsors for the new division. William Jabine, formerly editor of *Electric Refrigeration News,* is executive secretary.

GENERAL FOODS CORP. has acquired complete control of Frosted Foods Co., Inc., by purchasing stock held by the GOLDMAN SACHS TRADING CORP. The Frosted Foods organization was acquired jointly, under another name, by the two organizations in 1929. Prior to the recent transaction, General Foods held 51 per cent and Goldman Sachs 49 per cent of Frosted Foods stock.

INTERNATIONAL SALT CO. is expanding direct merchandising activities into ten additional Southern states. New offices in Nashville, Tenn., and New Orleans, La., will direct the sales of Avery salt, produced at the Avery Island (La.) plant.

SCHUTTER-JOHNSON CANDY CO., Chicago, Ill., has recently filed an involuntary petition in bankruptcy.

SEARS & NICHOLS CORP., vegetables canners, recently moved executive, accounting, and sales offices from Chillicothe, Ohio, to 860 Consolidated Building, Indianapolis, Ind. The office of the production department remains at Chillicothe.

SPRECKELS SUGAR CORP., whose plant at Yonkers, N. Y., has been idle for some time, was put in receivership on Jan. 18 on a petition of Rudolph Spreckels, of San Mateo, Calif. Assets are said to exceed liabilities, but are frozen in real estate and equipment.

THE BEST FOODS, INC., has been expanded to include the mayonnaise business of RICHARD HELLMANN, INC., a division of GENERAL FOODS CORP., as well as the mayonnaise business formerly handled as a division of the GOLD DUST CORP. Jay Gould, formerly vice-president and general manager of Best Foods, will be general manager of the combined organization. Gustav Winkelmann, vice-president of Richard Hellmann, Inc., will have charge of plant operations.

Patent Note

In the article, "High Vacuum Evaporation," by A. M. Mackie (FOOD INDUSTRIES, Vol. 3, December, 1931, pp. 528-30), no reference was made to the fact that the de-esterizing system and equipment described are developments of the Pfaudler Co., that patents are pending in the United States and have been issued in Canada, England, Germany and other countries.

PERSONAL

JAMES A. BERRY has been placed in charge of microbiological studies on frozen-pack fruits and vegetables at the Seattle (Wash.) laboratory of the U. S. Bureau of Plant Industry. He was formerly in the bacteriology department of the University of Washington.

RALPH M. BOHN has been appointed director of the Technical Institute of the Independent Biscuit Manufacturers Co., succeeding A. A. SCHAAL.

FRANK CHRIST has succeeded WILLIAM F. SCHLESINGER as general factory superintendent of Candy Brands, Inc. He will make his headquarters at the Brooklyn (N. Y.) plant. Mr. Christ was formerly connected with the Eatmor Chocolate Co., Pittsburgh, Pa.

THOMAS K. FAHY has been appointed vice-president and general manager of the Patent Cereals Co., Geneva, N. Y. He succeeds the late GEORGE S. TRANT.

N. FUAD, a member of the technical board of directors of Applied Sugar Laboratories, New York, N. Y., recently returned from a European trip where he investigated developments of technologists in England and on the Continent.

EDWARD P. GILLAN, superintendent and chief chemist of the Chicago Starch Co., has resigned to become vice-president and general manager of Paisley Products, Inc., Chicago, Ill.

ROBERT W. GUNNELS has been made general manager of the Columbus Coca-Cola Bottling Works, Columbus, Ohio.

EARL J. HESMAN has been appointed district sales manager of the General Foods Sales Co., Inc., in its Minneapolis territory. He was formerly in the sales department of the Igleheart division of General Foods. J. C. LEWIS has been appointed to the same position in the Atlanta territory.

CHARLES T. HIRST, sales manager of the Columbus (Ohio) plant of Purity Bakeries, Inc., has been made manager of the Columbus plant.

J. P. IVESON, formerly chief of the animal industry department of the California State Department of Agriculture, has been appointed chief market and food inspector for the city of Oakland, Calif.

ALFRED KNIGHT, vice-president of Standard Brands, Inc., has retired as active head of accounting. He remains a vice-president and consultant.

FRANK C. LOWRY, president of the National Biscuit Co., as well as of Lowry & Co., sugar brokers, has dissolved the latter organization to devote all his time to National Biscuit Co. operations. J. C. Callaghan & Co. has been organized by former members of the Lowry sugar firm to carry on the business.

J. E. MAGNUS and WALTER R. GREENLEE, respectively general sales manager and advertising director of the Pabst Corp., Milwaukee, Wis., have recently resigned.

THOMAS ALBERT POTTER, vice-president of the Quaker Oats Co. and connected with that organization for the past 25 years, has resigned to become president of the Elgin National Watch Co., Elgin, Ill.

A. P. SPENCE has been made field secretary of the American Bottlers of Carbonated Beverages. He will aid in the membership drive now under way as a part of the fight for unified action against tax laws.

WILLIAM B. TRAYNOR and JOHN HOLMES, both vice-presidents of Swift & Co., with more than 25 years of service to their credit, have been elected to the board of directors. At the last stockholders' meeting, directors were increased from nine to eleven.

OBITUARY

CORNELIUS W. ABBOTT, founder and president of C. W. Abbott & Co., Baltimore, Md., bitters manufacturers, died suddenly in Baltimore, on Jan. 10. He was 76 years old.

CLAUS S. CLAUSSEN, president of C. F. Claussen & Sons, Chicago, Ill., pickle and condiment manufacturers, died Dec. 20, following an automobile accident, in which he was injured. He was 70 years of age.

ELMER B. HOSTETTER, president and manager of E. B. Hostetter Co., manufacturers of evaporated sweet corn with plants at Green Camp and Richwood, Ohio, died on Jan. 11, at his home in Richwood. He was 49 years old.

WILLIAM H. NICHOLLS, founder and first president of the National Food Brokers' Association, died at his home in Winnetka, Ill., on Jan. 6. Born in Colorado 66 years ago, Mr. Nicholls organized William H. Nicholls & Co. in 1893, and subsequently acquired an interest in a number of canning plants. During the World War, he headed the division of coordination of food supply purchases.

ARNOLD H. PETER, who retired in 1928 after fifteen years as research chemist with the Royal Baking Powder Co., died in New York, N. Y., on Jan. 4. Dr. Peter was born in Switzerland 69 years ago, and was educated in Zurich.

JACOB SAALBERG, formerly president of the Sweets Co. of America, died in New York, N. Y., a few weeks ago. He had retired from active participation in the business in 1918.

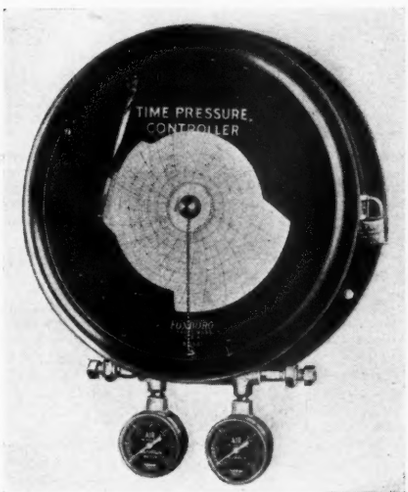
WILLIAM WRIGLEY, JR., who advertised chewing gum into a national habit and created an industry and a fortune as a result, died on Jan. 26 at the age of 70. Several years ago, his son, Philip K. Wrigley, succeeded him as president of the William Wrigley Jr., Co., but he continued as chairman of the board. In recent years, profits of his company have exceeded $10,000,000 annually.

NEW EQUIPMENT FOR FOOD MANUFACTURERS

Non-Recording Time Controller

Recently added to the line of temperature regulating devices manufactured by the Foxboro Co., Foxboro, Mass., is the instrument for controlling temperature or pressure in relation to time. It is claimed to maintain a predetermined cycle of operation in any process involving temperature or pressure through the co-acting relationship between a printed aluminum cam and a specially designed cam follower.

The cam is a printed aluminum disk having the size of a standard 10-in. recording chart. The markings are printed from plates similar to those used in the printing of Humitex charts. New cams to meet changed conditions can easily be cut with a pair of shears and a file.



In such applications as the maintenance of gas, water, or air pressures in lines where load requirements are predetermined, the controller is used in conjunction with a diaphragm motor lever and controlled valve to build up or let down pressure in the line according to previously determined load conditions.

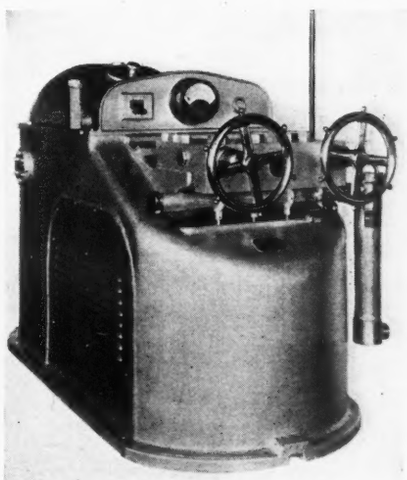
Fully Inclosed Homogenizer

Operation under a higher degree of cleanliness characterizes the 1,000-gal.per-hr. homogenizer manufactured by National Equipment Co., Springfield, Mass. This performance is made possible by having all moving parts fewer in number and inside the main casting. Also the motor is inclosed in the unit and is fully protected from water splash by baffle plates.

The homogenizing head consists of stainless steel forged in a solid block and is fitted with homogenizing valves equipped with an impact ring placed approximately $\frac{1}{16}$ in. from the discharge of the valve. This construction promotes increased efficiency in the homogenizing action and produces a finer emulsion than the usual valve construction.

The pump valves and seats (all the valve seats are replacable) can be supplied in bronze, stainless steel, or stellite. The front edge of the plate covering the plungers provides means for supplying cooling water to the plungers, yet is removable to give room for packing the plungers. Sanitary construction and location of the intake manifold and discharge outlet aid materially to prevent leakage during operation and to facilitate cleaning.

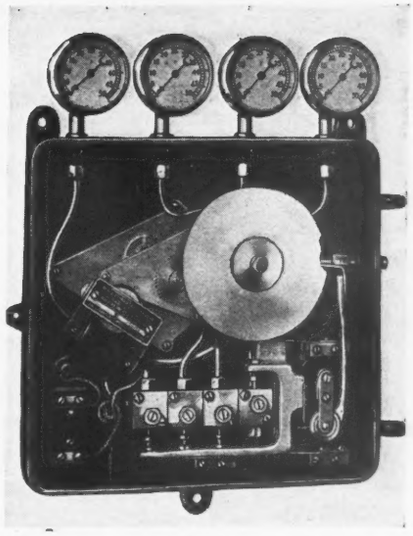
The motor drives direct through a flexible coupling and a steel worm running in ball bearings to a chilled bronze worm-



wheel shrunk and bolted directly onto the eccentric casting. The wormwheel, submerged 4 to 5 in. in oil, furnishes splash lubrication to each crosshead and wristpin. A positive pressure rotary pump, producing a gage pressure of approximately 25 lb., supplies oil directly to the bronze bearings, which bush the eccentric, to the bronze thrust bearings, and to each eccentric.

Cycle Regulator for Duration Control

The duration and sequence of operations actuated by steam, water, gas, electricity, or compressed air are controlled by the Tyme-Cycle Regulator, manufactured by the Taylor Instrument Cos., Rochester, N. Y. The instrument operates independently of temperature or pressure in the apparatus controlled, but is capable of operating in conjunction with either condition if desired. An electrically driven cam progressively opens or closes small pilot valves as it revolves, and the valves in turn regulate the supply of compressed air to diaphragm valves, electro-pneumatic switches, or other pneumatically operated devices. The cam is mounted on a camshaft which rotates in ball bearings and



steps are cut on the cam corresponding to the number of pilot air valves to be operated. Cam speed is increased or decreased by substituting new cams and gears.

This instrument is said to have application in the food-preserving industry, where carefully timed operation cycles largely determine the flavor and texture of the finished product.

New Industrial Paints

Within the past year new paints of three different types have become available to the food manufacturer.

One of these is of the varnish type manufactured by Bakelite Corp., 247 Park Ave., New York, N. Y. It contains a recently developed Bakelite resin which will combine with China wood oil or other varnish drying oils to give a varnish that is highly resistant to acids, alkalis, and temperature changes. This varnish can be applied as any other varnish to wood or metal, and upon drying gives a film that is tough, flexible, and glossy. Because it hardens by drying instead of by oxidation or heat treatment, this new varnish does not shrink, check, or peel. In addition to general uses for this resistant varnish, special use is being made of it to roller-coat metals to be used for making cans, collapsible tubes, and other containers for food products.

Similar to asphaltum paints in color and protective qualities is Liquilox, produced by the Liquilox Co., Ltd., 576 Subway Terminal Building, Los Angeles, Calif. This protective coating is said to be made from a ground ore and a volatile, somewhat inflammable, hydrocarbon. When fully dry the film is declared to be 99 per cent carbon and 1 per cent a constituent to give flexibility. It is also recommended for use on wood and concrete surfaces to protect against water, weathering, acids, alkalis, and brine; on metal also against indirect heat up to 1,400 deg. F. Application may be made by spray, brush, or dipping to show an approximate coverage of 300 sq.ft. per gallon. In 4 hours it dries sufficiently to be dustproof but, if more than one coat is to be applied, each coat should dry 24 hours.

The third is of the aluminum type developed by the Aluminum Industries, Inc., Cincinnati, Ohio, which can be applied to

wood, fabric, metal, or stone surfaces by spray, brush, or dipping. It is known as Permite Resalum and contains a hydrocarbon vehicle that volatilizes rapidly to leave a protective film which gives a high reflection of light, protection against moisture, corrosion, and unsightliness. Claim is made that it shows a coverage of twice that of similar products and that it is heat resisting to the extent that it can be applied to boiler fronts, smokestacks, and the like.

Flexible Action Lift Truck

Hydraulic in its lifting as well as in its lowering action, the lift truck developed by the Lyon Iron Works, Greene, N. Y., is reported to permit the operator to handle a 4,000-lb. load with unusual ease. A lifting action is obtained by operating the handle through a full stroke which describes an arc of 90 deg., through an intermediate stroke at any position, or through short strokes at the top for congested places and at the bottom for extra heavy loads up to 10,000 lb. Three and one-half full strokes of the handle are required to raise a load to the maximum height of 3 in.

Lowering of the load may be accomplished quickly by pressing heavily the lever on the handle bar or slowly and under operator control by pressing lightly on this lever. The load may be stopped at any height less than 3 in. by releasing the lever during the lowering operation.

With a turning radius of 360 deg., a raising or lowering action from any position of the handle, and a handle that will hold itself in any position, except lying on the floor, this truck is said to lend itself to advantageous use under congested and limited-space conditions. Although it will handle loads up to 10,000 lb., the rated capacity is 6,000 lb.

The truck is available in two popular models for use with platforms 17 or 26½ in. wide. The wheels of the smaller model are 6 and 7 in. in diameter and support a single frame to carry platforms 30, 36, or 42 in. long. The larger model has 7-, 8-, or 10-in. wheels supporting a single frame to carry platforms 42, 48, or 60 in. long. Other sizes can be furnished if desired. Also special wheels are obtainable in place of the standard broad-faced iron wheels fitted with Hyatt bearings.

All wearing surfaces and axles are of heat-treated steel and the frame with some other parts are electric-arc welded. Parts are interchangeable.

THE MANUFACTURERS OFFER

Rubber-Tire Casters and Wheels—A 36-page booklet known as catalog No. 5-C, with supplement, devoted to noiseless and ball-bearing trucks, illustrates and gives detailed specifications for the type of casters manufactured by Jarvis & Jarvis, Inc., Palmer, Mass.

Aluminum Paint—By means of illustrated broadsides, the Aluminum Industries, Inc., Cincinnati, Ohio, announces and gives uses for its aluminum paint known as Permite Resalum.

Portable Mixer—Propeller stirrers of the outboard type are described and illustrated in a folder issued by the Paterson Foundry and Machine Co., East Liverpool, Ohio.

Temperature Controllers — Neilan non-recording temperature controller is diagrammatically illustrated in a 16-page booklet Bulletin No. 3060-B, published by the Neilan Co., Ltd., 641 Santa Fe Ave., Los Angeles, Calif.

Essential Oils and Flavors — Fritzsche Bros., Inc., 78 Beekman St., New York, N. Y., have recently issued a 16-page wholesale price list.

Magnetic Switch — Bulletin GEA-841B contains illustrations and specifications on the cross-the-line starter for induction motors manufactured by the General Electric Co., Schenectady, N. Y.

Milk Heater—Double-tube precision milk heater for pasteurizing plants is described in Bulletin D-213 of the Creamery Package Manufacturing Co., 1243 West Washington Blvd., Chicago, Ill.

Milk—"A Graphic Story of Milk," prepared by the Douthitt Corp., Chicago, Ill., contains 16 pages of charts, graphs and data tables dealing with dairy statistics.

Indicators and Color Controls—In a 50-page illustrated booklet, the W. A. Taylor & Co., 872 Linden Ave., Baltimore, Md., discusses the theory and practice of modern pH and chlorine control.

Detergent for Bottle Washing — The cleansing properties of Metso (sodium meta-silicate), and the grades and uses of silicates of soda are described in detail in illustrated booklets issued by the Philadelphia Quartz Co., Philadelphia, Pa.

Lecithin—An 8-page booklet prepared by Ross & Rowe, Inc., 80 Broad St., New York, N. Y., tells the story of the development of Yelkin, a specially prepared lecithin blended with small quantities of a suitable fat, for use in the manufacture of confections.

Mixtures Used With Concrete—Directions for using Anti-Hydro to harden and waterproof concrete, and a description of how this solution works, are given by the Anti-Hydro Waterproofing Co., Newark, N. J., in a recent leaflet.

Car Loading—The method of loading cars with citrus fruits in Saxolin open-mesh bags is described and illustrated by actual photographs in a booklet issued by the Chase Bag Co., Cleveland, Ohio.

Recording Thermometers—A description of model "1,000," a precision thermometer of the wall mounting type, and its specifications is contained in a leaflet prepared by the Moto-Meter Gauge & Equipment Corp., Toledo, Ohio.

Stainless Steel Tubing—Bulletin No. 1-B, a detailed chart containing specifications and constituents of stainless steels, and a tabulation of stainless steel analysis has been published by the Globe Stainless Tube Co., Milwaukee, Wis.

Stories of Westinghouse Research—A 48-page fabrikoid bound booklet describes and illustrates research developments of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

Truck Distribution of Food Products—In a 32-page booklet the International Harvester Co. of America, Inc., 606 South Michigan Ave., Chicago, Ill., describes and illustrates International trucks used in the distribution of diversified food products.

House-to-House Delivery Truck—An illustrated release prepared by the White Co., Cleveland, Ohio, announces and gives detailed specifications of six-cylinder delivery trucks designed specifically for multiple stop service.

Milk Powder—The processes and systems used by the Rogers Co., Detroit, Mich., in the manufacture of powdered milk are described in a 35-page illustrated booklet, and information is given to assist in the marketing of surplus milk at a profit.

Electrical Equipment—Bulletin 821B, on pressure and vacuum switches; No. 1519, on grid type steel rheostats; and No. 1522, on motor starting switches. General Electric Co., Schenectady, N. Y.

Refrigeration and Air Conditioning—Equipment and installation plans for refrigerating and air conditioning the bakeries are discussed and illustrated in an eight-page booklet, bulletin No. 31112, of the York Ice Machinery Corp., York, Pa.

THE GOVERNMENT PUBLISHES

DOCUMENTS ARE AVAILABLE *at prices indicated from Superintendent of Documents, Government Printing Office, Washington, D. C. Send cash or money order; stamps and personal checks not accepted. When no price is indicated, pamphlet is free and should be ordered from bureau responsible for its issue.*

Low-Acid Rennet-Type Cottage Cheese, by H. L. Wilson and C. S. Trimble. U. S. Department of Agriculture, Miscellaneous Publication 119; 5 cents. Describes manufacture.

Marketing and Distribution of Fruits and Vegetables by Motor Truck, by Brice Edwards and J. W. Park. U. S. Department of Agriculture, Technical Bulletin 272; 20 cents.

Relation of Method of Watering Dairy Cows to Their Water Consumption and Milk Production, by T. E. Woodward and J. B. McNulty. U. S. Department of Agriculture, Technical Bulletin 278; 5 cents.

Buckwheat Milling and Its Byproducts, by Mayne R. Coe. U. S. Department of Agriculture, Circular 190; 5 cents.

Variety Tests of Sugarcanes in Louisiana, by George Arceneaux and others. U. S. Department of Agriculture, Circular 187; 5 cents. Applies to the crop year 1929-30.

Formulas for Completely and Specially Denatured Alcohol. Bureau of Industrial Alcohol, Appendix to Regulations No. 3, revised October, 1931; 5 cents. Valuable for all alcohol users.

Properties of Fiber Building Boards, by C. G. Weber and others. Bureau of Standards, Miscellaneous Publication 132; 5 cents. Tests described for all types of fiber board products, including those made from food-plant byproducts.

Canned Goods Statistics. Mimeographed releases from Foodstuffs Division, Bureau of Foreign and Domestic Commerce. Give preliminary estimates of 1931 pack of corn, peas, green and wax beans, and tomatoes.

CONSTRUCTION NEWS

Bakery — Haglund Bakery Co., 801 West Second St., Davenport, Ia., completed plans for a 1 story, 60 x 150 ft. bakery at Third St. and Brown Ave. Estimated cost $60,000. W. E. Long Co., 155 North Clark St., Chicago, Ill., is architect and engineer.

Bakery — Haller Baking Co., F. C. Haller, Pres., 204 Denniston Ave., Pittsburgh, Pa., will soon award contract for construction of a 2 and 3 story, 76 x 94 ft. distribution plant. Estimated cost $60,000. Paul R. Scheuneman, Magee Bldg., Pittsburgh, is architect.

Bakery Addition—C. O. Eith, 164 Turner St., Auburn, Me., receiving bids for a 1 story addition to bakery at Spring and Hampshire Sts. $40,000. Pulsifer & Eye, Inc., 163 Main St., Lewiston, are architects.

Biscuit Factory—Loose-Wiles Biscuit Co., Commerce Bldg., Kansas City, Mo., will soon award contract for first unit of factory to include warehouse, garage, and distribution building, at 600 East Gage Ave., Los Angeles, Calif. $100,000. Estimated total cost $1,500,000. Claud Beelman, 1019 Union Bank Bldg., Los Angeles, is architect.

Biscuit Factory—George Weston Biscuit Co. Inc., Watertown, Mass., plans reconstruction of factory unit destroyed by fire, at Howard and Acton Sts. Estimated cost $50,000. Architect not selected.

Bottling Plant — Coca Cola Co., Chickasha, Okla., will soon award contract for construction of a bottling plant and purchase of bottling and conveying equipment. Estimated cost $25,000. Private plans.

Bottling Plant — Spartanburg Coca-Cola Bottling Co., c/o W. G. Jackson, Pres., Spartanburg, S. C., acquired a site and plans construction of a 2 story, 68 x 124 ft. bottling plant. Estimated cost $85,000. Pringle & Smith, Norris Bldg., Atlanta, Ga., are architects.

Brewery—Northwest Brewing Co., Tacoma, Wash., plans construction of a new 6 story, 34 x 130 ft. unit to brewery at 107 East 26th St. Estimated cost $65,000 including equipment.

Candy Factory—Gunz-Durber Candy Co., 19 Marion St., Oshkosh, Wis., having plans prepared for reconstruction of factory destroyed by fire. Estimated cost $40,000. Auler & Jensen, Oshkosh, are architects.

Canning Plant—United Soviet Socialist Russia, c/o Amtorg Trading Corp., 261 5th Ave., New York, N. Y., plans construction of a canning plant at Kherson, 100 million cans annual capacity, area of 1,500 hectares of garden land assigned to supply food material. Estimated cost to exceed $1,000,000. Maturity soon.

Creamery Plant—Western Holstein Farms Inc., 3402 Avalon Blvd., Los Angeles, Calif., preparing plans for a 2 story, 70 x 150 and 45 x 80 ft. creamery plant at 31st St. and Grand Ave. Estimated cost $100,000. Charles T. Whittlesey, 1616 South Vermont Ave., Los Angeles, is architect.

Creamery and Dairy Barn—State Department of Public Works, Division of Architecture, Sacramento, Calif., awarded general contract for creamery unit and dairy barn at Preston School of Industry at Ione, to H. Schuster, 354 Hobart St., Oakland, $23,905; refrigeration to Carrier Engineering Corp. of Calif., 742 East Washington St., Los Angeles.

Dairy Building—Tennessee Agriculture & Industrial Normal, c/o P. L. Harned, Comr., State Board of Education, War Memorial Bldg., Nashville, Tenn., plans construction of a group of buildings, including dairy and stock building, etc. Estimated total cost $290,000.

Dairy Buildings—J. Weissglass, 2014 Forrest Ave., Elm Park, S. I., N. Y., having preliminary plans prepared for a 2 story store, office and garage at Elm Park. Estimated cost $150,000. Architect not announced.

Ice Cream Manufacturing Plant—Puritan Ice Cream Co., A. A. Rando, 3895 Washington St., Roslindale, Mass., preparing plans for construction of ice cream manufacturing plant at Barnstable. Estimated cost $50,000. Private plans.

Dairy and Creamery Plant—Gussaioff & Ellman Dairy Co., 1902 Park Ave., Weehawken, N. J., awarded contract for construction of a 2 story dairy and creamery plant on 39th St., North Bergen, to Bonanno Bros., 182 Bergen Turnpike, North Bergen. Estimated cost $40,000.

Milk Depot — Grandview Dairy Co., 6071 Metropolitan Ave., Middle Village, N. Y., plans alterations to milk depot. Estimated cost $25,000. H. C. Brucker, 1037 Kossuth Pl., Glendale, is architect.

Milk Plant—Western Holstein Farms, Inc., 3402 Avalon Blvd., Los Angeles, Calif., having plans prepared for construction of a 2 story, 80 x 105 ft. milk plant and 1 story, 70 x 150 ft. garage at 31st St. and Grand Ave. Estimated cost $75,000. Charles F. Whittlesey, 1616 South Vermont Ave., Los Angeles, is architect.

Farm and Dairy Buildings — Department of Mental Hygiene, State Office Bldg., Albany, N. Y., awarded general contract for construction of farm and dairy buildings at Harlem Valley Hospital, Wingdale. $34,980.

Cold Storage Warehouse—Steven J. Miller, 101 North Vine St., Marshfield, Wis., plans construction of a cold storage warehouse. Estimated cost $40,000. Architect not selected.

Ice House—Northern Pacific R.R. Co., St. Paul, Minn., awarded contract for construction of an ice house to include 500 ft. platform, 6,200 ton capacity at Missoula, Mont., to Morrison-Knudsen Co., Boise, Idaho. $41,000. E. Blum, St. Paul, is chief engineer.

Ice and Cold Storage Plant—Atlantic Ice & Coal Co., c/o G. A. Robertson, Engr., 106 Washington St. Viaduct, S. E., Atlanta, Ga., plans to remodel building for ice and cold storage plant at Rome. Work will be done by day labor.

Ice and Cold Storage Plant—Consumers Public Service Co., c/o Percy Markham, Pres., Brookfield, Mo., will build a 1 story, 100 x 125 ft. ice and cold storage plant, by day labor at Chillicothe. Estimated cost $55,000.

Ice Plant—Mongiello Bros., 625 Communipaw Ave., Jersey City, N. J., rejected bids for construction of 1 story 100 x 100 ft. ice plant. $50,000. Christian Ziegler, 26 Journal Sq., Jersey City, Archt.

Ice Plant—Webster Ice Co., A. H. McKinstrey, Webster, Mass., will build a 2 story ice plant on West Main St. Estimated cost $40,000. Private plans. Work will be done by separate contracts.

Ice Manufacturing Plant—L. T. Wood Co., Bissell St., Manchester, Conn., awarded contract for construction of a 1 story ice manufacturing plant to G. Schreiber & Son, Inc., 285 West Centre St., South Manchester. Estimated cost $75,000.

Cheese Factory—Kraft-Phoenix Cheese Co., 400 Rush St., Chicago, Ill., completed plans for construction of a factory including boiler room, new equipment, etc., at Marshall, Ind. Estimated cost $25,000. W. M. Baird, 400 Rush St., Chicago, is engineer.

Food Products Warehouse — First National Stores, Inc., Mystic Ave., Somerville, Mass., awarded contract for a 1 story, 50 x 300 and 35 x 220 ft. warehouse including salvage building, loading and meat platforms, etc., to Turner Construction Co., 137 Newberry St., Boston. Estimated cost $150,000.

Food Storage and Preparation Building — Board of Trustees, Miami University, Oxford, O., preparing plans for construction of a 2 story building to contain facilities for storing food in bulk and partial preparation of food, also baking and ice cream plant, etc. Estimated cost $100,000. Garber & Woodward, 4 West Seventh St., Cincinnati, are architects. Fosdick & Hilmer, Union Trust Bldg., Cincinnati, are engineers.

Market Building—Ralph's Grocery Co., 926 West 7th St., Los Angeles, Calif., awarded contract for construction of a 1 story, 80 x 195 ft. market building including refrigeration rooms, electric refrigeration system, etc., at 7813-21 South Vermont Ave. to S. N. Benjamin, 718 East 16th St., Los Angeles. $44,000.

Soda Products Plant—Iowa Soda Products Co., Council Bluffs, Ia., plans to rebuild plant recently destroyed by fire. Estimated cost $150,000. Lewis F. Salisbury, Manager.

Alfalfa Mill—Denver Alfalfa & Millling Co., Lamar, Colo., plans reconstruction of mill destroyed by fire at Sugar. Estimated cost $25,000.

Flour Mill—Acme-Evans Co., 852 Washington Ave., Indianapolis, Ind., plans to expend $100,000 for rebuilding plant to include machinery and equipment. Private plans.

Flour Mill—Nebraska Consolidated Mills Co., c/o A. R. Kinney, Pres., 1521 North 16th St., Omaha, Neb., having plans prepared for construction of a flour mill, 1,200 bbl. capacity. Hower & Wyatt, 468 Board of Trade Bldg., Kansas City, Mo., are architects.

Grain Elevator—Windsor Elevator Co., C. Vannatter, Pres., 208 Dominion Bank Bldg., Toronto, Ont., awarded contract for construction of a 2,000,000 bu. grain elevator, two units each 480 ft. long, also 65 x 200 ft. warehouse at Windsor, to Fegles Construction Co., 201 Grain Exchange Bldg., Fort William. $1,250,000. Interested in prices for equipment.

Gra'n Elevators—Provisional Government of Argentina, plans construction of 130 grain elevators in provinces of Buenos Aires, Santa Fe and Cordoba, seven 1,000 ton, twenty-one 2,000 ton, forty-two 3,000 ton, thirty-six 5,000 ton, twenty-one 7,000 and three 10,000 ton capacity each.

Abattoir Addition—Feidman Bros., Laurel St., Elizabeth, N. J., will soon award contract for a 1 story addition to abattoir. Estimated cost $40,000. A. J. Silberstein, 892 18th Ave., Newark, is architect.

Meat Plant—Brighton Dressed Meat Co., 39 Commercial St., Boston, Mass., awarded contract for a 2 story addition to meat plant to H. L. Hauser Building Co. Inc., 31 Bay St., Dorchester. $40,000.

Packing Plant (Meat)—B. F. Stauffer, Rocky Ford, Colo., plans construction of first unit of meat packing plant at Lamar. Estimated cost $25,000.

Packing Plant (Meat)—John Morrell & Co., Ottumwa, Ia., will receive bids about March 1 for construction of a 6 story, 120 x 160 ft. plant for storage and testing of meats. Estimated cost $400,000. H. P. Henschien, 59 East Van Buren St., Chicago, Ill., is architect and engineer.

Packing Plant—Swift Canadian Co. Ltd., 17 Water St., Vancouver, B. C., awarded contract for addition to packing plant consisting of hog fuel shed, refinery building, 40 x 60 ft. boiler house, smokestack, etc., to Addison & Dill, 319 Pender St. W., Vancouver. Estimated cost including equipment $60,000.

Rendering Plant—Wisconsin Rendering Co., c/o C. L. Drude, Treas., Appleton, Wis., awarded contract for a 1 story, 60 x 150 ft. rendering plant to Fred Hoeppner & Sons, 1203 North Union St., Appleton. Estimated cost $40,000.

Packing Plant—Frank Wolk Inc., 757 Crown St., Brooklyn, N. Y., awarded contract for a 2 story addition to packing plant at Johnson Ave. and White St., to O. Joroff, 336 East 95th St., New York.

Packing Plant Addition—Rath Packing Co., J. W. Rath, Pres., Waterloo, Ia., will soon award contract for a 1 story, 71 x 179 ft. addition to beef house at Sycamore and Elm Sts. Peter H. Henschein, 59 East Van Buren St., Chicago, Ill., is architect. John St. Bartley, c/o owner, is associate architects.

Lemon Storage Building — Upland Lemon Growers Association, L. R. Bradley, Pres., Upland, Calif., awarded contract for construction of a 3 story, 140 x 200 ft. lemon storage building at Fourth Ave. and A. St., to W. J. Nethery & Son, 2259 Main St., Riverside. Estimated cost $90,000.

Packing Plant (Citrus and Vegetable)—Smith Provision Co., Owensboro, Ky., will soon award contract for construction of a 1 story citrus and vegetable packing plans at Harlingen, Tex.

PATENT DIGEST

Baking and Milling

Loaf Portions of Dough Formed by Plunger Type of Dough Divider — Frank Streich to Union Machinery Co., Joliet, Ill. No. 1,826,031. Oct. 6, 1931.

Baking Pans United by Side Rails to Facilitate Handling and at the Same Time to Give Advantageous Baking Conditions of Pans in Single Unit—Harry A. Lockwood to Lockwood Manufacturing Co., Cincinnati, Ohio. No. 1,826,080. Oct. 6, 1931.

Dough Divider of the Oscillating Pocket Cylinder Type—Thomas S. Vierow, Jersey City, N. J. No. 1,826,230. Oct. 6, 1931.

Means for Handling Dough Mechanically During Proving Period—James Elliott Wilson, Samuel McConnell and Campbell Brown, Belfast, Ireland. No. 1,826,537. Oct. 6, 1931.

Sliced Bread Held and Handled in Loaf Unit Form Between Slicing and Wrapping Machines—Otto F. Rohwedder to Mac-Roh Sales & Manufacturing Co., Davenport, Iowa. No. 1,826,676. Oct. 6, 1931.

Leaky Pies Prevented by Semicircular Devices to Hold Crust Edges Intact During Baking — Agnes W. Austen, Bovill, Idaho. No. 1,827,062. Oct. 13, 1931.

Biscuits Cut and Panned by Machine Whose Dough-Cutting Mechanism Operates in Conjunction With Means for Receiving and Containing the Biscuits—Carl Becker, 15 per cent to Robert G. Garrett, Nashville, Tenn. No. 1,827,133. Oct. 13, 1931.

Combination Baking Oven and Endless Conveyor Fitted With Series of Baking Pan Units Connected to Endless Conveyor—Carl Becker, one-fourth to Robert E. Garrett, Nashville, Tenn. No. 1,827,134. Oct. 13, 1931.

Adjustable Guide for Dough Molders—William G. Kirchhoff, one-half to J. H. Day Co., Cincinnati, Ohio, and one-half to Thomson Machine Co., Belleville, N. J. No. 1,828,049. Oct. 20, 1931.

Proofer Having Two Parallel Conveyors Traveling One Below the Other With Tray-Emptying Device in Upper Conveyor—Gustav B. Eggert to Baker-Perkins Co., Saginaw, Mich. No. 1,823,441. Sept. 15, 1931.

Flattened Strips of Pastry Dough Formed Into a Plural Number of Pretzel-like Coils Cooked in Oil and Coated With Honey—Michael Conforto, Philadelphia, Pa. No. 1,824,594. Sept. 22, 1931.

Canning and Glass Packing

A Pair of Rotatable Turrets for Can Filling Machines Fitted With Telescope-Section Measuring Units — Charles H. Ayars to Ayars Machine Co., Salem, N. J. No. 1,828,167. Oct. 20, 1931.

Can Delivering Mechanism Combining Screw Worm Type Conveyor With Feed Regulating Units—Charles H. Ayars to Ayars Machine Co., Salem, N. J. No. 1,828,168. Oct. 20, 1931.

Rotating Drum Type of Can Feeder to Filling Machine—Peter Kruse, Brooklyn, N. Y., to E. W. Bliss Co., New York, N. Y. No. 1,828,324. Oct. 20, 1931.

Cutter Head for Corn Cutting Machine—Frank W. Douthitt, Ortonville, Minn. Nos. 1,828,647, 1,828,648, and 1,828,649. Oct. 20, 1931.

Packaged Foods Cooked During Passage Through Plural Number of Drums Equipped With Conveyors Subject to Controlled Rotation—William De Back, San Leandro, Calif., to Sprague-Sells Corp., Hoopeston, Ill. No. 1,828,961. Oct. 27, 1931.

Confectionery

Candy-Bar Forming and Cutting Machine—Walter H. Sergent to Ideal Wrapping Machine Co., Middletown, N. Y. No. 1,831,826. Nov. 17, 1931.

Candy Conveyor Belt Consisting of Strong Paper Base Covered With Flexible Varnish Coating — Samuel Croft, Bryn Athyn, Pa. No. 1,831,846. Nov. 17, 1931.

Molds for Sucker Type Confections—Emmett L. Fox, Hinton, W. Va. No. 1,833,896. Dec. 1, 1931.

Methods and Means for Wrapping Candy, Filled Chocolates, and Other Types of Small Confections — Otto Lauenstein, Wernigerode, Germany. No. 1,834,460. Dec. 1, 1931.

Dairy and Egg Products

Basement-Feed Type of Bottle Washing Machine With an Endless Bottle Conveyor—George J. Meyer, Milwaukee, Wis., to George J. Meyer Mfg. Co., Cudahy, Wis. No. 1,825,008. Sept. 29, 1931.

Fresh-Drawn Milk Cooled and Subjected to CO_2 Atmosphere by Use of Solid CO_2 in Receiving Vessel—James W. Marton, Jr., Yonkers, N. Y., to Dryice Equipment Corp., New York, N. Y. No. 1,825,645. Sept. 29, 1931.

Milk Cooled by Circulating Through Units Consisting of Outer and Inner Casings Between Which Is Situated a Cooling Unit Element Through Which Circulates a Cooling Liquid—Isaïe J. B. Demers to Superior Metal Products Co., St. Paul, Minn. No. 1,826,750. Oct. 13, 1931.

Copies of Patents

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

Photostatic copies of foreign patents may be obtained at the same address, prices being forwarded on application.

Copies of patents should be ordered by number, as titles used in this digest seldom correspond with title of patent.

Horizontal Ice Cream Freezing Machine—John H. Hagen to the H. H. Miller Industries Co., Canton, Ohio. No. 1,827,873. Oct. 20, 1931.

Cream Separator — Felix C. Sandstrom, Milwaukee, Wis., to International Harvester Co., Chicago, Ill. No. 1,828,546. Oct. 20, 1931.

Cam-Operated Brush for Bottle Washing Machines — George J. Meyer and Otto Dreher to George J. Meyer Mfg. Co., Milwaukee, Wis. No. 1,830,068. Nov. 3, 1931.

Fruits and Vegetables

Fresh Fruits Preserved for Market Purposes by Preservative Materials to Delay Ripening of Unripe Fruit for Predetermined Lengths of Time—Ernest M. Brogden to Brogdex Co., Winter Haven, Fla. No. 1,827,219. Oct. 13, 1931.

Fruit Peeled by Machine Equipped With Forked Mandrel Operating in Conjunction With the Devices for Centering Fruit on Mandrel and for Removing Centering Device From the Mandrel Path of Travel—Mary J. Casey, San Jose, Calif., to Sprague-Sells Corp., Hoopeston, Ill. No. 1,827,869. Oct. 20, 1931.

Vegetable Slicer Operating Through a Horizontal Plane—Otto Erl to Otto Foods Machinery Co., Oakland, Calif. No. 1,827,977. Oct. 20, 1931.

Fruits and Vegetables Preserved by Treatment With Fungicides Containing Ionized Iron, an Aliphatic Alcohol and a Free Acid—Ansel S. Wysong, Los Angeles, Calif., one-half to Charles H. Popenoe, Silver Spring, Md. No. 1,828,518. Oct. 20, 1931.

Pickled Vegetables Prepared by Being Heated by Stages in Pickling Solution to a Maximum Temperature of Less Than Boiling—Edmund Alfred Hey to Rose Field Packing Co., Inc., Alameda, Calif. No. 1,829,932. Nov. 3, 1931.

Air Conditioning Unit for Ripening Fruit in Storage—James O. Walsh, New York, N. Y. No. 1,829,951. Nov. 3, 1931.

Fruit Washed and Rinsed in a Continuous Manner During Passage Through Washing Machines—Clarence P. Wilson, Ontario, Calif., and Robert D. Neddidek, Pomona, Calif., to California Fruit Growers' Exchange, Los Angeles, Calif. No. 1,830,180. Nov. 3, 1931.

General Equipment

Mechanically Refrigerated Storage and Display Case—Richard O. Ashton to Kelvinator Corp., Detroit, Mich. No. 1,826,339. Oct. 6, 1931.

Air Conditioned for Temperature Range, Relative Humidity, and Light Ray Intensity—Joseph M. LeGrand to Carrier Engineering Corp., Newark, N. J. No. 1,827,530. Oct. 13, 1931.

Weighing Mechanism for Slicing Machine—Cornelis F. M. Van Berkel, Wassenaar, Netherlands, to U. S. Slicing Machine Co., LaPorte, Ind. No. 1,827,917. Oct. 20, 1931.

Combination Slicing and Weighing Machine—Cornelis F. M. Van Berkel, Wassenaar, Netherlands, to U. S. Slicing Machine Co., LaPorte, Ind. No. 1,827,918. Oct. 20, 1931.

Mechanism for Covering Bottles With Open-Ended Wrappers—Percy D. Bickford, one-half to Campbell Guillod Thompson, Vancouver, B. C., Canada. No. 1,828,123. Oct. 20, 1931.

Automatic Control for Mechanically Refrigerated Cars—Samuel G. House and Rex C. Snell to American Refrigerator Car Co., Miami, Fla. No. 1,828,566. Oct. 20, 1931.

Explosion-proof Motor-Driven Ventilating Fan—Jens A. Paasche, Wilmette, Ill. No. 1,828,746. Oct. 27, 1931.

Plate-Inclosed Coil Type of Refrigerator for Storage and Display of Frozen Foods—Herman W. Kleist to Dole Refrigerating & Machine Co., Chicago, Ill. No. 1,824,158. Sept. 22, 1931.

Packaging Machine Designed Specifically for Handling Packaged Cereal Products—John L. Kellogg, Peter W. Foster, Richard F. Poole, and Morris Raymer to Kellogg Co., Battle Creek, Mich. No. 1,824,401. Sept. 22, 1931.

Meat Packing

Meat Loaf Packing Machine — Rudolf Punzmann, one-half to Frank Firor, New York, N. Y. No. 1,830,335. Nov. 3, 1931.

Sausage Branded During Smoking Operations by Marker Designs on Outside of Casings—Charles Schaaf, Forbes M. Morrison, and Andrew L. Henkel, Milwaukee, Wis., and Ralph E. Williamson, Wauwatosa, Wis., to Frank Schaaf Co., Milwaukee, Wis. No. 1,830,410. Nov. 3, 1931.

Miscellaneous Processes

Fat-bearing Materials Acidified to Give a pH Value Between 5 and 1 and Heating to Liquefy and Separate Fat From Other Material—Jan Aret Schnheyder Van Deurs, Frederiksberg, Denmark. No. 1,833,061. Nov. 24, 1931.

Wheat Malt Products in Solid Form Consisting of Maltose, Dextrins, and Soluble Proteins—Francois M. Dupont to International Wheat Malt Syrup Co., Chicago, Ill. No. 1,829,743. Nov. 3, 1931.

Wheat Malt Syrup Manufacturing Process—Richard Schneider and Francois M. Dupont to International Wheat Malt Syrup Co., Chicago, Ill. No. 1,829,762. Nov. 3, 1931.

Culinary Oil Extracted From Seeds by Heating Seed Particles With Water to a Temperature of 212 Deg. F. and Subjecting to Pressure and Filtration — Dionis E. Moldowan, Detroit, Mich. No. 1,829,961. Nov. 3, 1931.

Production of a Comparatively Pure Culture of Mushroom Spawn—William R. E. Andrews, Philadelphia, Pa. No. 1,830,631. Nov. 3, 1931.

Starch, Sugar and Molasses

Method of Manufacturing Starch in Which Water and Gluten Are Re-used for Separating Starch and Gluten From New Batches of Corn—Rush O. McCoy, Berwyn, Ill., to International Patents Development Co., Wilmington, Del. No. 1,832,229. Nov. 17, 1931.

Automatic Process for Continuous Extraction of Sugar-Containing Plant Tissue—André Olier to Société Anonyme des Establissements A. Olier, Clermont-Ferrand, France. No. 1,832,472. Nov. 17, 1931.